Doc.
Ontario. Legislative Assembly

SESSIONAL PAPERS.

VOL. XXX.—PART VI.

FOURTH SESSION, EIGHTH LEGISLATURE

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PROVINCE OF ONTARIO.

SESSION 1897-8.

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LIST OF SESSIONAL PAPERS.

ARRANGED ALPHABETICALLY.

Title.	No.	Remarks.
Accounts, Public	2	*Printed.*
Agricultural College, Report	17	“
“ “ Farm Proper	62	*Not printed.*
“ “ Purchase money	65	*Printed.*
Agricultural Experimental Union, Report	52	
Algonquin Park, Sales of Jewellery in	51	*Not printed,*
Asylums, Report	10	*Printed.*
Bee-Keepers' Associations, Report	21	*Printed.*
Births, Marriages and Deaths, Report	29	“
Blind Institution, Report	14	“
Butter and Cheese Associations, Report	24	“
Canadian Niagara Power Company, Agreement	48	*Not printed.*
Children's Protection Act, Report	16	*Printed.*
Children, British, Immigration of, Report	60	“
Colonization Roads, expenditure	44	*Not printed*
Courts, business done	63	“
Crown Lands, Report	4	*Printed.*
Deaf and Dumb Institute, Report	15	*Printed*
Division Courts, Report	6	“
Education, Report	1	*Printed.*
“ Examinations, Report (*part of*)	1	“
“ School Books, Report	64	“
Engledue Syndicate, correspondence	66	“
“ “ mining concessions	47	*Not print*
Entomological Society, Report	20	*Printed.*
Estimates	3	“
Examinations, Report on (*part of*)	1	“
Factories, Report	27	*Printed*
Farmers' Institutes, Report	26	“
Forestry Commission, Report	45	“
“ Report on	34	“
Fruit Experiment Stations, Report	19	“
Fruit Growers' Association, Report	18	“

TITLE.	NO.	REMARKS.
Game and Fish Commission, Report	30	*Printed.*
Gaols, Prisons and Reformatories, Report	11	“
Guardian *ad litem*, Account	61	*Not printed.*
Health, Report	35	*Printed.*
Hospitals, Report	13	“
Humber piggery, Cholera in	41	*Not printed.*
Immigration, Report	5	*Printed.*
Industries, Report	32	“
Insurance, Report	9	“
Legal Offices, Report	28	*Printed.*
Live Stock Associations, Report	25	“
Loan Corporations, Report	36	“
Manvers, audit of accounts	46	*Not printed.*
Mines, Report	33	*Printed.*
Mining Concessions	47	*Not printed.*
Moore Lumber Company	59	“
Mosgrove, Judge	39	“
Municipal Auditor, Report	43	*Printed.*
Official Guardian, *ad litem*, account	61	*Not printed.*
Poultry Associations, Report	22	*Printed.*
Public Accounts	2	“
Public Works	8	“
een Victoria Niagara Falls Park Report	31	*Printed.*
“ “ “ Agreement	48	*Not printed.*
Refuge, Houses of, Report	12	*Printed.*
Registrars. fees	57	“
oad-making, Report	23	“
ndeau Park, water fowl	50	*Not printed.*
tary and Registrar, Report	56	*Printed.*
aying, Report	49	“
tutes, Report *re* Consolidation	42	*Not printed.*
sted, Lot 13 in	53	“
Sullivan, John, Payments to	55	“
Tavern and Shop Licenses, Report	7	*Printed.*
Timber, Coffin addition	54	*Not printed.*
“ Manufacture of	58	*Printed.*
Toronto University, Auditors' Report	38	“
“ “ Finance	37	“
Upper Canada College Report	40	*Not printed.*

LIST OF SESSIONAL PAPERS.

Arranged in Numerical Order with their Titles at full length; the dates when Ordered and when presented to the Legislature; the name of the Member who moved the same, and whether Ordered to be Printed or not.

CONTENTS PART I.

No. 1.. Report of the Minister of Education of the year 1897, with the Statistics of 1896. Presented to the Legislature 16th December, 1897. *Printed.*

No. 2.. Public Accounts of the Province for the year 1897. Presented to the Legislature 8th December, 1897, and 10th January, 1898. *Printed,*

No. 3... Estimates for the year 1898. Presented to the Legislature 10th December, 1897. *Printed.* Estimates (supplementary) for the year 1898. Presented to the Legislature 12th January, 1898. *Printe* Estimates (vote of credit). Presented to the Legislature 2 December, 1897. *Not Printed.*

CONTENTS PART II.

No. 4. Report of the Commissioner of Crown Lands for the year 18 sented to the Legislature 13th January, 1898. *Printed.*

No. 5.. Report of the Department of Immigration for the year 1897. Presented to the Legislature 13th January, 1898. *Printed.*

No. 6.. Report of the Inspector of Division Courts for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 7.. Report on the working of the Tavern and Shop Licenses Acts for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 8... Report of the Commissioner of Public Works for the year 1897. Presented to the Legislature 12th January 1898. *Printed.*

No. 9.. Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1897. Presented to the Legislature 9th December, 1897. *Printed.*

CONTENTS PART III.

No. 10.. Report upon the Lunatic and Idiot Asylums for the Province for the year ending 30th September, 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 11.. Report upon the Common Goals, Prisons and Reformatories of the Province for the year ending 30th September, 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 12.. Report upon the Houses of Refuge and Orphan and Magdalen Asylums of the Province for the year ending 30th September, 1897. Presented to the Legislature 12th January, 1898. *Printed.*

CONTENTS PART IV.

No. 13.. Report upon the Hospitals of the Province for the year ending 30th September, 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 14.. Report upon the Institution for the Education of the Blind, Brantford, for the year ending 30th September, 1897. Presented to the Legislature 9th December, 1897.

No. 15.. Report upon the Institution for the Education of the Deaf and Dumb, Belleville, for the year ending 30th September, 1897. Presented to the Legislature 9th December, 1897. *Printed.*

. 16.. Report of the Work under the Children's Protection Act for the year 1897. Presented to the Legislature 13th January, 1898. *Printed.*

7.. Report of the Ontario Agricultural College and Experimental Farm for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

CONTENTS PART V.

No. 18.. Report of the Fruit Growers' Association of Ontario for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 19.. Report of the Fruit Experiment Stations of Ontario for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 20.. Report of the Entomological Society of Ontario for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 21.. Report of the Bee Keepers' Association for the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 22.. Report of the Poultry and Pet Stock Associations of the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

CONTENTS PART VI

No. 23.. Report of the Provincial Instructor in Road making in Ontario for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 24.. Report of the Butter and Cheese Associations of the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 25.. Report of the Live Stock Associations of the Province for the year 1897 Presented to the Legislature 10th January, 1898. *Printed.*

No. 26.. Report of the Superintendent of Farmers' Institutes of the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 27.. Report of the Inspectors of Factories for the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 28.. Report of the Inspector of Legal Offices for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

CONTENTS PART VII.

No. 29.. Report upon the Registration of Births, Marriages and Deaths in the Province for the year 1896. Presented to the Legislature 12th January, 1898. *Printed.*

No. 30.. Report of the Ontario Game and Fish Commission. Presented to the Legislature 10th January, 1898. *Printed.*

No. 31.. Report of the Commissioners for the Queen Victoria Niagara Falls Park for the year 1897. Presented to the Legislature 14th January, 1898. *Printed.*

No. 32.. Report of the Bureau of Industries for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

CONTENTS PART VIII.

No. 33.. Report of the Bureau of Mines for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 34.. Report of the Clerk in charge of the Forestry Branch, Crown Lands Department. Presented to the Legislature 11th January, 1898. *Printed.*

No. 35.. Report of the Board of Health for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 36.. Report of the Financial Statements made by Loan Corporations for the year 1897. Presented to the Legislature 10th January. 1898. *Printed.*

No. 37.. Report of Standing Committee on Finance, Toronto University, for the year 1897-98. Presented to the Legislature 20th December, 1897. *Printed.*

No. 38.. Auditor's Report on Capital and Income Accounts, Toronto University for the year ending 30th June, 1897. Presented to the Legislature 9th December, 1897. *Printed.*

No. 39.. Copy of an Order in Council directing the payment out of the Surplus Surrogate fees of $500 to His Honour Judge Mosgrove. Presented to the Legislature 9th December, 1897. *Not Printed.*

No. 40.. Reports of the Principal, and Statements of Bursar of Upper Canada College, shewing receipts and expenditures 1896-97. Presented to the Legislature 16th December, 1897. *Not Printed.*

No. 41.. Return to an Order of the House of the 13th day of December, 1897, for a Return shewing the value of the hogs which died, or were slaughtered at the Humber piggery during the outbreak of cholera in July, 1896. Presented to the Legislature 16th December, 1897. Mr. *St. John.* *Not Printed.*

No. 42.. Report of the Commissioners appointed to revise and consolidate the Public Statutes of the Province. Presented to the Legislature 23rd December. 1897. *Not Printed.*

No. 43.. Report of the Provincial Municipal Auditor for the year ending 30th November, 1897. Presented to Legislature 28th December, 1897. *Printed.*

No. 44.. Return to an Order of the House of the thirty-first day of March, 1897, for a Return shewing the expenditure on Colonization Roads, Bridges and other Roads in the Province for the last five years, shewing in each case the Electoral District or Districts in which each of the said Colonization Roads, Bridges and other Roads was situated. Presented to the Legislature 30th December, 1897. Mr. *Little.* *Not printed.*

No. 45.. Report of the Forestry Commissioners, Preliminary. Presented to the Legislature 4th January, 1898. *Printed.*

No. 46.. Return to an Address to His Honour the Lieutenant-Governor of the seventeenth day of December, 1897, praying that he will cause to be laid before the House a copy of the Petition presented to the Lieutenant-Governor in Council asking for an Audit of the Books, Vouchers, etc, of the Township of Manvers. A copy of the Commissioner's original report, together with his supplementary report. Also copies of all correspondence in connection with the matter. Presented to the Legislature 6th January, 1898. Mr. *Willoughby.* *Not printed.*

No. 47.. Return to an Order of the House of the thirteenth day of December, 1897, for a Return of copies of all correspondence, papers and documents between the Government, or any Department thereof, and all parties who have made application for mining concessions of a similar nature to those now enjoyed by the Engledue Syndicate under agreement with the Government; or any other concessions not now provided for by or within the provisions of the present Mining Act. Presented to the Legislature 6th January, 1898. Mr. *St. John.* *Not printed.*

No. 48.. Return to an Order of the House of the twenty-second day of December, 1997, for a copy of the Agreement entered into between the Commissioners of the Queen Victoria Niagara Falls Park and the Niagara Falls Electric Railway Company and the Canadian Niagara Power Company for the use of the surplus power of the said Railway Company in the generation of electricity. Presented to the Legislature 6th January, 1898. Mr. *German.* *Not printed.*

No. 49.. Report of the Superintendent of Spraying, Ontario, for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 50.. Copy of an Order in Council amending the Regulations respecting the shooting and taking of wild duck and other water fowl in the waters within two miles of Rondeau Provincial Park in Rondeau Harbor. Presented to the Legislature 11th January, 1898. *Not printed.*

No. 51.. Copy of an Order in Council respecting the sale of watches, jewellery or other goods of a like kind in Algonquin National Park. Presented to the Legislature 11th January, 1898. *Not printed.*

No. 52.. Report of the Agricultural and Experimental Union for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 53.. Return to an Order of the House of the twenty-second day of December last for a Return of copies of papers, documents and all correspondence between any member or officer of the Government and any other person or persons in reference to Lot No. 13, Concession 3, Township of Stisted. Presented to the Legislature 12th January, 1898. Mr. *Langford.* *Not printed.*

No. 54.. Return to an Order of the House of the twenty-ninth day of December last for a return of copies of all correspondence between the Commissioner of Crown Lands, or any official of the Department, and any person or persons in reference to the cutting of timber under license or trespass in the tract of land known as "Coffin" Addition. Presented to the Legislature 12th January, 1898. Mr. *Miscampbell.* *Not printed.*

No. 55..	Return to an Order of the House of the sixth day of January, 1898, for a Return shewing all payments made to Captain John Sullivan, an *employee* of the Government since January 1st, 1897, and shewing the time list since that date, where he was employed and amount received since that time. Such Return to state if paid by month, year, fees or day wages. Presented to the Legislature 12th January, 1898. Mr. *Reid* (Addington). *Not printed.*
No. 56..	Report of the Secretary and Registrar of the Province for the year 1897. Presented to the Legislature, 12th January, 1898. *Printed.*
No. 57..	Return of all Fees and Emoluments received by the Registrars of Deeds of the Province for the year 1897. Presented to the Legislature, 12th January, 1898. *Printed.*
No. 58..	Documents *re* the Manufacture, in Canada, of Pine Timber cut on the Crown Domain. Presented to the Legislature, 12th January, 1898. *Printed*
No. 59..	Return to an Order of the House of the twenty-second day of December last for a Return of copies of all papers, documents and correspondence between the Government, or any Department thereof, and any other person, persons or corporations in any way relating to the dealings of the Moore Lumber Company with the Crown Lands Department or with the Government; together with a full return of copies of the evidence taken at the investigation of the said Company's dealings with the Government, or any Department thereof, and of all other documents and correspondence in connection therewith, as well as a copy of the report and finding of the Commissioners appointed to investigate the same. Presented to the Legislature, 12th January, 1898. Mr. *St. John*. *Not printed.*
No. 69..	Report on the Immigration of British Children. Presented to the Legislature, 13th January, 1898 *Printed.*
No. 61..	Account of the Official Guardian *ad litem*, for the year 1897. Presented to the Legislature, 13th January, 1898. *Not printed.*
No. 62..	Return of an Order of the House of the thirty-first day of March, 1897, for a Return shewing how many acres of land are contained in the "Farm Proper" at the Ontario Agricultural College, and how many horses, cattle, sheep and pigs were kept on the farm in the year 1896. Shewing as well, if the farm produced sufficient food or fodder to maintain the stock for the whole year And shewing how much it cost, over and above what was raised on the farm, to maintain the stock for the year. Presented to the Legislature, 13th January, 1898. Mr. *Haggerty*. *Not printed.*

No. 63.. Return to an Order of the House of the eighth day of March, 1897, for a Return shewing the business done during each of the years 1892, 1893, 1894, 1895 and 1896 in the following Court in this Province, namely:—1. The High Court of Justice: (1) The number of writs issued out of the High Court of Justice in each of the above years: (2) The number of Records entered for trial of the said years; (3) The number of cases set down for appeal to the Divisional Courts of the High Court in each of the above years; (4) The number of cases set down for appeal to the Court of Appeal for each of the above years: (5) The number of cases appealed to the Supreme Court at Ottawa for each of the above years. 2. The County Courts: (1) The number of writs issued out of the County Courts of the Counties of the Province in each of the above years; (2) The number of Records entered for trial in the County Courts of this Province in each of the above years: (3) The number of County Court cases set down for appeal from the said County Courts to the Court of Appeal in each of the above years. 3. The Division Courts: (1) The Number of writs issued in the Division Courts of this Province in each of the said years; (2) The number of cases tried in the Courts in each of the said years: (3) The number of appeals taken from the Division Courts to a higher Court in each of the above years: (4) The number of Judgments by default entered during each of the above years in the Division Courts. Presented to the Legislature, 13th January, 1898. Mr. *Marter.* *Not printed.*

No. 64.. Report of the Commission appointed to enquire into the matter relative to the price of School Books, etc. Presented to the Legislature, 14th January, 1889. *Printed.*

No. 65.. Return to an Order of the House of the twenty-fourth day of March, 1897, for a return shewing the cost of, or purchase money paid for the Ontario Agricultural College; acreage of the property, together with the amount of land now under cultivation; expenditure thereon, since its establishment, upon buildings, stock, fencing, drainage and all other accounts. Together with receipts from students in fees, sale of stock, produce and other sources. Presented to the Legislature, 14th January, 1898. Mr. *Willoughby.* *Printed.*

No. 66.. Return to an Order of the House of the fourteenth day of January, 1898, for a Return of copies of all correspondence or reports in the possession of the Government respecting the operations of the Engeldue Syndicate during the past season on the locations or concessions granted at the beginning of the year. Presented to the Legislature, 14th January, 1898. Mr. *Dickenson.* *Printed.*

REPORT

OF THE

PROVINCIAL INSTRUCTOR IN ROAD-MAKING

ONTARIO

1897.

(*PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE.*)

PRINTED BY ORDER OF
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1898.

REPORT

OF THE

PROVINCIAL INSTRUCTOR IN ROAD-MAKING,

1897.

To the Honorable JOHN DRYDEN,
Minister of Agriculture.

SIR,—I herewith beg to submit to you my report for the year 1897, on Road and Street Improvement in Ontario. It is gratifying to record the increasing interest which is being taken in this branch of public work, and to observe the efforts in many districts and in many ways, to bring about reform. A large number of municipalities were visited by me during the year, addresses delivered and reports made (as outlined in my report of 1896), the requests for my services in this respect being very numerous, so numerous, I regret, that it was impossible to comply with all. The fullest information appears to be everywhere desired, and any means suggested for bettering the condition of the common highways, is given the most earnest consideration.

I have the honor to be,

Sir,

Your obedient servant,

A. W. CAMPBELL,
Provincial Instructor in Road-making.

PARLIAMENT BUILDINGS,
TORONTO, Ontario, 10th January, 1898.

CONTENTS.

PAGE

LETTER OF TRANSMISSION ... 3

GOOD ROADS—A NATIONAL PROBLEM ... 7

COUNTRY ROADS:

Statute Labor—Waste of Money—Utilizing Statute Labor—Duties of Supervisor—Pathmasters—Gravel Roads—Purchase of Gravel—Broken Stone—Placing the Road Metal—Crowning the Road—Consolidating the Material—A Smooth Surface—Keep the Road Dry—The Open Drain—Foundation—Underdraining—The Effect of Frost—Maintenance—Road Graders—A Road Roller—A Stone Crusher—Wagon Tires—Dimensions of Roads—Hills—Location of Roads—Culverts—Bridges—In Brief ... 12

THE GOOD ROADS MOVEMENT:

Canada, Massachusetts, Michigan, New York, New Jersey, Connecticut, Rhode Island, Wisconsin, Quebec ... 28

MUNICIPAL REPORTS ... 31

REPORTS FROM CITIES, TOWNS AND VILLAGES ... 32

TOWNSHIP REPORTS ... 41

COUNTY REPORTS ... 53

BRANTFORD BOARD OF TRADE ... 55

REPORT ON THE STREETS OF THE CITY OF GUELPH, ONTARIO:

The Expenditure—Oversight—Classifying the Streets—Choice of Pavement—Earthwork—Drainage of Roadways—Foundation—A Road Roller—A Crusher—Sewers—Some Illustrations—In Conclusion ... 56

EXTRACTS FROM A REPORT TO THE CITY OF ST. JOHN, N.B.:

Stone Block Pavements—Asphalt—Vitrified Brick—Wood Pavements—Cost of Pavements... 62

THE FRONTAGE TAX SYSTEM—FORM OF BY-LAW ... 66

REPORT

OF THE

Provincial Instructor in Road-Making.

GOOD ROADS—A NATIONAL PROBLEM.

The demand for increased transportation facilities, for more rapid transit, for better and shorter routes is arising from all quarters, is far reaching and urgent. In response to this, railways are improving the character of their roadbeds and rolling stock. Canals are being deepened and widened, and harbors improved. Vessels of greater capacity and speed are being constructed. Cold storage is being provided. In the cities electric street railway systems have displaced the slower horse cars, and are stretching their tendrils along the country highways; the bicycle has obtained a prominent place in the transaction of business; motor carriages may be seen on the streets of the larger cities, and present indications are that they will soon become an important means of travel and transportation. Nations are growing greater and stronger, and trade is forcing its way more rapidly and with greater volume along the veins and arteries of commerce.

Addressing the Board of Trade of Toronto, the chief commercial city of Ontario, the Premier of the Dominion recently said: "Let us cheapen the cost of transportation, and from that moment we have in the markets of Great Britain a preference for the products of Canada." Referring more directly to the importance of the common highway and its relation to trade, the Premier of New Brunswick, the Hon. H. R. Emerson, in an address at a banquet recently tendered him in the city of St. John said: "I have already given you assurance on behalf of my Department that the good roads movement will be furthered and encouraged as far as in our power lies. The betterment of our public highways which are avenues of transportation and form an essential part of the great system which is necessary to transfer the products of our farms from the farm granaries to the busy markets of the old land, is a most desirable end to be attained, from the standpoint of economics, as well as from social or other standpoints."

The question of road improvement has been too much regarded as a matter of individual loss or gain. It is necessary to convince farmer Jones that he is losing yearly by bad roads $50, Brown that he is losing $75, Smith that he is losing $100. This is the phase which the good roads advocate most frequently has to meet. Seldom is the problem regarded in the broad light of its influence upon national prosperity. The total production of Ontario farms has a value annually, it is estimated, of $200,000,000. All this must first pass over the common highways before reaching the markets. It is the basis of Ontario's wealth. The amount is far in excess of that needed for home consumption and the only resource is to obtain a market in foreign countries. This market is available only so far as we can sell more cheaply, and produce a better quality than other competing countries. It is not the effect on present conditions which constitutes the evil of bad roads; but it is in the conditions which they prevent that the loss lies. It is not on the principle that it is so expensive to draw one load of produce to market, but in the principle that, with every means provided for easy, quick and good transportation, a market would be created for two loads. Many links in the system of transportation are being perfected, but the chain will not be complete without cheap transportation over the first part of the journey, the common country highways.

Good Roads and Agriculture.

Good roads will be of vast benefit to agriculture. They increase the profits of the farm by decreasing the cost and difficulty of transportation. It is cheaper to draw produce to market in one load than in two; on the same principle that it is cheaper that one team and a driver to do the work of two teams and two drivers. Good roads will increase the opportunities of farming and extend the range of marketable produce. Fruit and other perishable articles can be marketed in better condition, and a purchaser will be obtained for produce which now cannot be taken to market because of the difficulty of transporting it from the farm to the city or railway station.

A market in England is awaiting all kinds of Canadian fruit as soon as the difficulty of carriage is overcome and the fruit offered for sale in sound condition. Rapid transit on steamship and railway, with cold storage, is being provided, but until the fruit can be taken from the farm to the railway in the best possible condition; that is, with the greatest speed and least amount of jolting, we must labor at a serious disadvantage. With cheese, the constant complaint is that the quality of the Canadian product is not what it should be. Cheesemakers are all aware that the quality of the cheese is injured by churning the milk over rough roads; and that a more uniform quality can be obtained by making the cheese in large factories, a condition which can only be brought about by making the roads such that the milk can be carried greater distances.

The dulness and isolation of farm life will be overcome by good roads, and they will thereby tend to elevate and bring about a better citizenship. The school, the church, the public meeting, the neighbor's house will be more easily reached. The effect of all this, the increased land value, the greater profits and pleasures of the farm, is to render the country attractive rather than repellant. The effect is to draw the people of the city to the country rather than drive the people of the country to the city. "How can we relieve the congested condition of our cities?" "How can we keep our boy on the farm?" are questions demanding an early solution. By making the farm profitable, by giving to energy and ambition sufficient business opportunities on the farm, these problems will be solved, and one of the most important factors in the solution is "Good Roads."

Good Roads and Commerce.

Good roads are of great benefit commercially. Agriculture is the foundation of the wealth of this country. As agriculture prospers so will business prosper. Better home markets and better foreign markets for the farmer will bring more money into the country. This means increased sales for the merchant and a greater demand on the manufacturer. Bad roads, beside the retarding influence on the country by lessening its ability to compete in foreign markets, cause produce to be marketed, not as prices or the demand require, but as the roads permit. The result is that the market is alternately glutted or starved; there is either unnatural excitement or depression. The stores are either deserted or extra clerks have to be employed. Railways either cannot provide cars to move the contents of the granaries, or else their cars and their crews are in idleness. Such fluctuations cannot but be hurtful.

When farmers can market their produce easily and regularly they have money with which to enable the merchant to turn over his stock and meet his obligations at the bank. The banks are thereby enabled to do business to greater advantage, and the whole machinery of commerce moves with less friction, less useless expenditure of energy. The stringency which so often takes place in the fall as a result of bad roads; the bad roads of Christmas time which so often bring disappointment to the merchant; the resulting failures which act and react on all classes of society are all of too frequent occurrence.

ONTARIO ROADS.

It is doubtful if there is a mile of true macadam road in Ontario, outside of a few towns and cities. There are miles of road which are covered with dirty gravel or rough, broken stone, and are popularly supposed to be macadamized, but they more resemble the roads Macadam found in England three-quarters of a century ago, the kind he removed, rather than those he constructed.

A century ago the roads of Ontario, such as existed, and they were very few, were mere trails. To-day, notwithstanding the amount of money and labor placed on them, the majority are little better than trails. This criticism may seem overdrawn to those who drive over some of the best gravel roads during the summer season; but if the journey had been made in the fall or spring, the rainy seasons, its fairness would become more apparent.

While the majority of highways in Canada are strikingly like the trails from which they have sprung, nevertheless we have highways which are of surpassing magnificence. The Canadian Pacific Railway spanning the continent is, in extent, daring and durability of construction, unequalled in the world. The populous districts of Canada are covered with networks of steel; while other lines are being projected wherever opportunity presents itself. But while capital has exhibited so much enterprise in providing the great lines of commerce, the lesser routes have been overlooked and neglected. Common highways, while less in extent and cost, are not one whit less in importance. Over them must first pass all the freight which feeds the greater railways, and it is this first cost of transportation which so enormously increases the cost of production, and lessens our ability to compete in the markets of the world. The improvement of country highways is an investment, not a tax, and will be a most profitable one, commercially and socially.

From the middle of October until the end of December, and from the first of March to the middle of May, a period of five months, by far the greatest part of the mileage of the Province is mud, ruts and pitch holes. This may vary somewhat at the more northerly and more southerly parts of the Province, but it is the general rule of the average year. Of this period of five months there are at least two months of the year when the roads are practically impassable for loads. From the middle of November until the middle of December; from the middle of March until the middle of April, the agricultural trade of the country is practically cut off. For the remaining three months of the five the roads are barely passable. To this may be added January and February, for part of the Province, those southerly counties of Western Ontario where sleighing exists for two or three weeks at the most. If we include a winter month (and during the winter there are many days when travel is shut off), there are six months of the year when travel and teaming in Ontario is retarded by bad roads. Part of that time, at least two months, as pointed out, country traffic is practically impossible. If during those two months fortune favors us with a few days when teaming can be done, there are plenty of days during the remainder of the year to make two months of impassable roads over the Province generally.

AN ESTIMATE.

It is difficult to fully estimate what this means to each farmer individually, as it affects the value of his farm, the marketing of his produce, his business affairs, social intercourse of himself and family with his neighbors, attendance at church, at public meetings, the attendance of the children at school, and numerous other similar matters.

Horses are standing idle in the barn eating hay and oats when they would otherwise be at work earning their food as well as eating it. The idleness of horses means in the great majority of cases idleness of the teamster.

In order to forestall the bad roads the farmer goes about his business, does his teaming and marketing while roads are good in the early fall. His plowing is left until the roads are bad, but when the roads are bad the ground is soaked and unfit for cultivation. It is on clay land where the roads are generally the worst; in such districts it is generally found that marketing and cultivation come in the order described, and it is clay soil which is most injured by being worked when saturated with moisture. It cannot be argued that these matters are of no consequence. Many individual farmers may be willing to put up with all these drawbacks. But when aggregated, the loss is one which the country as a whole cannot afford.

The statistics compiled in the Bureau of Industries show that in 1896 there were in Ontario 434,384 working horses owned by the farmers of Ontario. This number does not include the unbroken horses nor breeding mares, but represents the number actually used for work. Let us assume, and the assumption is a very moderate one indeed, that one-half of these horses, which would otherwise work, are prevented from doing so for two months or sixty days of the year, and that their teamsters are also left in idleness. This means that for sixty days 108,596 teams and 108,596 teamsters are idle. The price paid generally is $3 per day for a team with a driver, and is a proper estimate of the value to the country. The direct financial loss daily, therefore, is at least $325,788, and for sixty days, $19,547,280—no inconsiderable tax for one Province with a population of about two million. At three per cent. this is the interest on a capital of $651,576,000.

There is nothing in this of the annual loss through the interference with trade. There is nothing of the loss of time, there is nothing of the smaller loads which have to be drawn at all seasons of the year because of merely rough roads. There is nothing of the increase in land values that would result through good roads. There are many thousand of acres in Ontario which are remote from the market towns and with only common dirt roads over which the market can be reached. These isolated farms are of very little value, worth not one-half nor one-quarter what they will be when first-class roads are provided. Instances are not lacking to show that property in the immediate vicinity of even a city market has increased fifty per cent. by the construction of good roads. When we consider that very few roads in even the oldest and best settled districts are what they should be, and that many are decidedly what they should not be, it is apparent that the increase in land values throughout the Province by a complete system of roads would be very great.

THE OBJECTS OF REFORM

The means whereby the roads of Ontario have been brought to their present state have been wasteful in the extreme. There has undoubtedly been earnest effort and honest motive on the part of many. But in the absence of systematic management little could be expected. Statute labor has been assessed, the nominal value of which is one dollar per day. It is safe to say that the average day of statute labor as actually performed is not worth fifty cents. Even if honest work had been given, it has been applied in a manner so disconnected and with so little knowledge of the true principles of road-making, that economical results could not be anticipated. To bring order out of chaos is the work of the road reformer. If we are to have good roads in the country, it is only by building them in a business-like way, on business principles.

The general system of roads required by the Province is not of an expensive kind. Gravel roads, or in the absence of gravel, broken stone roads, built cheaply but well, are needed. They should be built in such a way as to suit the traffic over them. Roads which are either insufficiently strong, or which are stronger than necessary, are each of them wasteful. There is no immediate likelihood of roads of the latter kind being built. The great defect which now characterizes them is that they are not strong enough, are of the kind which "break up." Roads should be constructed and kept in such a state of repair that they will not "break up." Roads which are rutted, cut up and converted into a canal of mud for any part of the year, in that time are injured to such an extent that the labor placed on them is largely thrown away. The "breaking up" process forces the stone down into the mud, mixes the mud with the stone, and takes away the durability of the road. The gravel and broken stone should be placed on the roadway and so maintained that at all times it will form a smooth, hard crust. To provide roads for the light and moderate traffic which passes over the generality of our country highways, and to do so in the most economical manner, there is need of the most skilful application of the principles of road-making as to choice and preparation of materials; drainage; the use of proper implements; re-locating the road in some instances so as to best avoid steep grades, cuts, fills and bad ground; grading, crowning, etc. All this, and much more, is now left unreservedly to the pathmaster. Until good business ability, system, and a knowledge of road-making are combined there cannot be good roads in this Province.

How to place before the people of this Province roads which will educate, roads which will by their merit compel their extension widely and within a reasonable period, is a problem deserving of an early solution. Only those who have been active in promoting the cause of good roads can appreciate the difficulty. While there is a demand for good roads by the general public, there is still a prejudice existing in favor of old systems and old methods which it is difficult to counteract by ordinary measures. The good roads movement in Ontario has reached the stage where a united effort of the foremost citizens should be made. What is needed is that there should be measures taken to improve in a large way the main roads of the Province. Whether this should be done by each township municipality, or whether a county, or even a provincial road system should be adopted to attain this end, are questions which are to be considered.

Township systems are in force throughout the greater portion of the Province, and the result we have with us. Hastings is the only county which has a well developed county system, and the means employed there have a decidedly beneficial effect on the roads. Wherever roads, however, have been brought to the highest excellence, as in France, England or Germany, and wherever on this continent the good roads movement has reached its most successful stage, as in Vermont, New Jersey, Connecticut or Massachusetts, state aid has been given to greater or less extent.

One mile of good road will secure more converts to the cause of improved roads than will ten miles of bad roads. The people of this country have for years been driving over bad roads. They know what bad roads are, but do not know what good roads are. A few years ago town streets which could boast of coal oil lamps possessed a luxury, and we were contented for we knew nothing of gas. When gas replaced the kerosene it was pronounced a marvel. To-day so far are we from returning to the dim light of coal oil that electricity is not brilliant enough. When the people see them, experience them, feel and know the benefits of good roads, there will be no possibility of a return to the mud and ruts that now prevail.

The object of the good roads movement must be attained by a process of education. Good roads are their own best advocates. That is wherein the strength of the road reform movement lies. One step in advance is never lost, but lends impetus for the next. A single example of a good road will argue more for the cause of road improvement than will a volume of words. A good road must be seen to be fully appreciated. The benefits cannot be stated in dollars and cents, but have to be experienced in order to be realized.

COUNTRY ROADS.

Do we actually want good roads? Or are bad roads preferable? Is the cry that has been raised throughout the length and breadth of Canada and of this continent: "We want good roads," the demand of men in their sober senses? Or has labor and money been placed on our roads for a century past merely to fill in time, and keep our surplus capital in circulation. If we do not want good roads, if bad roads are preferable, why should we want roads at all?

We must have roads. That necessity having been placed upon us, the experience which has taught us the wisdom of building other structures substantially, teaches us the economy of having roads that are good. We want roads which will withstand wear. We want the labor and money spent on them to be a paying investment. We want roads which will be good no matter what the state of the weather. We want roads which will not become rutted immediately the fall rains come on or when the frost leaves the ground in the spring, remaining in rough ridges for a considerable part of the summer. A road which does this is a bad road. The money and labor spent on it is largely forced down into the mud, is plowed under within a year and wasted. A good road is an economical road.

In building an economical road, improvements must be made in such a way that they will last. Roads in Ontario have been built on the same principle as is a wagon which breaks down under the first load, and is used for firewood after a year of service. Most of the leading roads of Ontario have been made and remade a score of times and are still bad roads. They are of the kind that "break up." A road that "breaks up," like anything else that breaks up, is a poor investment. When road building is rightly understood in this country, township councillors will no more think of building roads that will break up in the spring than they will think of constructing houses that break up in the spring, barns that break up in the spring, or fences that break up in the spring.

The road builders of this country have not given sufficient consideration to the effect of building bad roads. Year after year work of a flimsy, shiftless character is placed on the roads. The results are only temporary and are destroyed by a very little wear and traffic. In a very short time the work has to be done over again. But the evil does not end with this. This annual demand for repairs is so great that no township can respond to it. The roads instead of being repaired when they need it are neglected, grow worse and worse, and all the evils of bad roads follow.

What bad roads are doing for this country is only one side of the evil. The other side is what they are not doing. The loss does not arise so much from the money and labor wasted every year as it does from the absence of the benefits which good roads would bring. Our loss must be measured not so much by the money and labor we are throwing away on bad roads, as by the opportunities which would come to us if the roads were good.

One of the greatest obstacles in the way of road improvement is the narrow view taken of the question by so many citizens of this country. They have been accustomed to think of roads merely as incidental to statute labor; and statute labor they consider as a means whereby each pathmaster can get a littte work done in front of his own farm which will be of direct personal advantage.

They do not see nor appreciate the benefits which would accrue to the township, county and province. They overlook the public good. But public good is merely individual benefit conferred on every citizen. Money and labor spent on the roads of the township will enhance the value of every farm by increasing the demand for farm land; it will increase the profits of the farm by reducing the expenses of the farm. The dairying industry would be immensely benefited by good roads, fruit growing would become more remunerative; sale would be obtained for products which now are not grown because the market cannot be reached easily and quickly.

STATUTE LABOR.

The great majority of roads in Canada are under the control of township councils, and are built by statute labor supplemented by money grants. The statute labor system is suited to a pioneer age. It suits the abilities of the people making a home in a new country, and it suits the spirit of their circumstances. They feel keenly the need of improving their roads, and work with a will earnestly and faithfully. That was the history of statute labor in the pioneer days of what are now the populous districts of Canada. But where the townships have grown wealthy and well populated, a different condition exists. To such an extent has statute labor degenerated that some townships find that they can do more work by commuting all the labor at thirty-five cents per day.

If statute labor has not outgrown its usefulness, there is certainly need for reform when a man's labor is worth less than thirty-five cents a day. A feeling in favor of statute labor still holds in some localities but is growing weaker. There is not a country in the world, characterized by good roads, where a system of statute labor is in use. To a slight, but very slight extent, it may be said to be used in France, but with very different methods of applying it. If it is to be retained in Ontario, the present feeling of the people strongly indicates that it will have to be placed on a basis whereby satisfactory results can be obtained.

There is a prevalent opinion that a resident on a concession road knows better than anyone else the requirements of that particular road. A remarkable feature, however, is that no two citizens agree in their ideas of what work should be done, or how it should be done. No doubt there are cases in which one man is right, but when one man is right all the rest must be wrong. Pathmasters are appointed in turn from among these to plan and superintend the roadwork. The only result which could reasonably follow from such a system is that which we find—waste and bad roads.

The result of this lack of supervision is mismanagement in actual road construction. A description of the actual work done sounds like ridicule, however earnest it may be. A statute labor day is short, of eight hours, but the men are rarely on the ground for more than six hours. A good part of the six hours is spent in gossip, in arguing as to what should be done, and in finding fault with what is being done. Another part is spent in looking up scrapers and plows that should have been provided before the work was commenced. When we consider the class of teams sent out by the rate-payers, the wagons which can carry only half a load, the boys who come to do a man's work, these and many other details, the friends of statute labor must necessarily frame numerous apologies.

Statute labor is performed at a time of year when every farmer can use his time to good advantage on his own land, but instead of remaining where he can do the most profitable work he uses his time in paying a road tax. A large part of the time spent in road work is unquestionably wasted. In addition a considerable part of our annual tax is also expended on the roads. A careful consideration of this expenditure will show that many of the leading roads, far from being good, cost much more than first-class roads should cost. Nor is this all; the most regrettable feature is that through improper plans and imperfect construction the most expensive form of maintenance has been imposed.

WASTE OF MONEY.

Councils commonly appropriate an amount of money each year to be spent on the roads. If this money were spent in making complete and durable work it would be of the greatest assistance in improving the roads. We find, however, that the money is distributed in small sums among the pathmasters, is spent in small sums for repairing temporary culverts: in doing a little draining in front of the farm of some discontented ratepayer to appease him; in doing no particular work at all, but merely to give some voter an opportunity to earn a few dollars. In such ways as these is the money which should be spent on durable improvements, scattered, wasted and misapplied.

IMPROVING PRESENT CONDITION.

If a supervisor were appointed, if pathmasters, (and fewer of them) were appointed for a term of years to carry out the directions of the supervisor, and if to these positions the right men were appointed, a considerable step would be taken towards the better management of roads in the townships. Under systematic management, money and labor could be made to work together to the best possible advantage. At present each pathmaster is given a few dollars and a few days of labor. He is surrounded by neighbors. Nothing but patchwork can be expected. By consolidating this money and labor; by using the statute labor in the ways in which it can be turned to the best advantage; by using the money in purchasing material and doing work to which statute labor is not adapted; by seeing that all this work is properly done, and at the right time, much would be done to improve present conditions.

UTILIZING STATUTE LABOR.

One of the most profitable methods of using statute labor is to utilize it in hauling gravel. In this work there is less opportunity for wasting time; it is work which is more agreeable than much of the other work of grading and ditching; it is work which the average farmer understands to be of direct benefit and is entered into heartily.

It follows that it is better for other means to be used in performing other work. For the grading of the roads there is machinery which every township should possess. For the operation of these machines one man should be hired, as skill and experience are absolutely necessary. It cannot be passed around from farmer to farmer like a scraper or a plow. These machines do not know how a road should be shaped, but in the hands of a man who does, they are exceedingly valuable. For draining and ditching it is usually best to hire the work done by men who are accustomed to this class of work. One of the most necessary steps to be taken so as to receive the greatest benefit from statute labor is to see that the material, whether gravel or broken stone, is prepared in the pit or quarry, ready to be drawn to the road. If screening, crushing or stripping a pit is necessary, it should be done before statute labor commences. Gravel may be plentiful, but of a very inferior quality. Usually no effort is made by the council to screen the gravel, remove the surface soil from the pit or in any way prepare the gravel for being placed on the road. Teamsters go to the pit, one or two at a time; it is of inferior quality, but they cannot undertake the task of removing the earth and clay, in order to satisfy their few days of labor. In other sections there is no gravel, but field and quarry stone is to be found in abundance, frequently along the road to be improved. But with this material unprepared for road work, nothing can be done by the farmers except to plow and scrape the mud, and in other ways put in their time in useless effort. If the council would purchase or otherwise employ a rock crusher to prepare this stone and leave it ready for hauling, if they were to purchase screens, strip pits, etc., and see that nothing but first-class gravel was provided, farmers would be encouraged and would willingly spend their time to the fullest extent in hauling this material.

A SUPERVISOR.

The first and greatest need of every and any system of road construction, is to have one man at the head of the work to act as a general supervisor. He must be a practical man, and if possible, experienced in road construction, and acquainted with the principles underlying it. The advantage of having such an officer, appointed by by-law, with term of office as secure as that of a township clerk, will be best explained by stating his duties:

1st. The supervisor should prepare a plan of his district, or township, showing all roads, and the location on them of all culverts, bridges and water courses, classifying roads according to their requirements.

2nd, He should prepare a list of all culverts and bridges, showing dimensions, material used in construction, their condition and the direction of the watercourses passing through them, with memoranda as to the course of the water and location of the outlet.

3rd. The plans and records should show, as to roads, whether they are of gravel, stone or earth, graded or ungraded, the system of drainage, and nature and extent of traffic upon them. He should carefully study the present and future requirements of traffic on all roads, the class of roads best suited to such traffic, the width and depth of metal, width of graded portion, amount of crown and other details of construction.

4th. He should possess full information as to location, extent and quality of material suitable for road construction, and amount of plank and timber obtainable from ratepayers in the township or district, suitable for repairs.

5th. He should report to the council as early as possible in each year, showing the number and location of culverts and small bridges to be re built or repaired. with a detailed statement of all material required for this work, and an estimate of the cost. It would also be advantageous to have a probable estimate of material required during the following year, presented each fall so that, if thought advisable, it may be purchased and delivered on the ground during winter months or other most convenient season, and in this way utilize as much as possible the labor of ratepayers during the slack season.

6th. His report should specify the condition of all bridges, indicating those which require repairs or reconstruction, together with an estimate of cost, and a statement dealing with such special protection work on streams as he may deem worth the council's consideration. There should also be reference to any needed re-location or deviation of existing roads with a view to doing away with bridges, culverts, expensive grades, cuts or other features which tend to prevent permanent work and economic maintenance.

7th. He should consult with all pathmasters and report to the council, showing the number of days labor in each division, the work to be undertaken, and the amount of money which should be appropriated by the council to properly utilize the statute labor.

8th. He should arrange with divisions desiring to compound statute labor for a term of years, with a view to the construction of permanent and finished work.

9th. He should take stock annually and report to the council on all machinery and implements, showing their condition and where kept.

10th. He should carefully examine all parts of the township where gravel and stone exist, and should by borings and tests determine the quality and extent, and report thereon to the council. All material, stone, plank, gravel, etc., should be purchased by the supervisor in large quantities and under instructions from the council, the required amount to be determined by his estimates referred to above. As far as possible the material should be purchased by tender, and due consideration should be given to any ratepayer having such material for sale. When purchased it should be delivered and stored at convenient points and placed in charge of and used by the pathmaster, subject to the order of the supervisor, and in emergency work.

11th. He should prepare specifications of all work for which the council makes appropriations. Contracts should be awarded to the lowest bidder if proper security is given, but the work should be subject to the approval of the supervisor, and all accounts should be certified by him before payment.

PATHMASTERS.

There are many men in this province who are capable of taking the oversight of road construction, but the system of changing the pathmasters every one or two years is not likely to produce men who are well qualified in this respect. Appointed in the spring, the pathmaster has no time to make a study of the subject such as it demands. Nor is the fact that he will be succeeded by someone else as pathmaster the following year an encouragement to effort in this direction.

Road divisions or "beats" should be from three to five miles in length. A pathmaster should be a permanent officer, and his division should preferably be such that the most of his travel will lead him over the greatest portion of it. He need not receive a salary but may as a slight recompense be preferred in doing small jobs under the supervisor, where the work is not considered of sufficient importance to be let by contract. He should in addition give special attention to all emergency work, such as washouts, broken culverts and bridges. If the time required to oversee the statute labor in his division is more than would be needed for his own statute labor, he should be paid for such excess under certificate of the supervisor or council, the object being to secure proper supervision of all work performed; the council or supervisor to determine whether the excess time was actually necessary to oversee the work of the division, in accordance with the local by-law of rules and regulations, which should be framed so as to include this matter.

GRAVEL ROADS.

Gravel is very plentiful in many parts of Canada, and where it can be obtained of a good quality within reasonable hauling distance, makes a cheap but good road surface. As previously pointed out, it should be clean, containing little sand and clay, since it is the stone, not the earthy materials, which are needed on the road. Nor should large stones and boulders be mixed with it, as they will work up and roll loosely under the feet of the horses and the wheels of vehicles.

In the preparation of gravel it is frequently advisable to place a stone crusher with screen attachment in the pit. By passing all the gravel through, the sand and clay are removed and the large stones broken by the one operation. If the gravel is fit to be placed on the road without such treatment, in nearly every case it will be necessary to send a man over the road to rake off large stones and break them by hand.

Much carelessness is exercised in taking gravel out of the pit. In the pit we may find, for example, the surface layer of from two to four feet composed of earthy matter, then a layer of four or five feet of good gravel, then a stratum of coarse sand one or two feet thick, and underlying this another stratum of fairly good gravel. The common practice followed by teamsters is to scrape down the face of the pit, causing the soil, clean gravel and sand to mix together at the bottom. This is put in the wagons and taken to the road.

Very few gravel pits provide material fit in its natural state for use on the road. Screening and crushing are often necessary, particularly the former, to remove sand and clay from among the stone. It is the stone which is wanted on the road—not the sand and clay. There is enough sand and clay already on the road without drawing it several miles from the gravel pit. Dirty gravel, while it unites readily and forms a good roadway in dry weather, dissolves, turns slushy and ruts with equal readiness in wet weather, whereas with clean material the stones assume a mechanical clasp the one of the other that will not yield to the same extent in wet weather.

Earth and sand attract moisture and after a few hours rain the road becomes softened. In this slight ruts are formed which hold water, the whole structure becomes saturated, weakening the bond and permitting each successive vehicle to churn the ruts deeper until the gravel coating is cut through.

PURCHASE OF GRAVEL.

A great many townships buy gravel by the load. This is very much like buying water by the pailful instead of digging a well. Gravel should be bought by the pit or by the acre, and should be available at all times for any farmer who wants to increase the value of his land by improving the road past it. Especial care should be taken by councils to see that, prior to the performance of statute labor, the pit is stripped and the gravel otherwise treated if necessary.

This material, purchased at from five to ten cents a load, when mixed with an excessive amount of sand or clay, is a most expensive road material for much travelled highways. When we consider the number of pits in some townships and their immense size, representing that thousands of loads have been taken out, and then consider the short mileage gravelled, we must readily see that something in the quality of material and the mode of construction is radically wrong. In some instances much more than the value of a whole farm has been paid for gravel purchased by the load and taken from a small corner. If first class material were used, under ordinary traffic the annual repairs rendered necessary would be very slight.

In searching for gravel, the clearest indications are usually to be found along the banks of streams, where any extensive strata is apt to be exposed. A post-hole auger affords a convenient means of making tests over the surface of the soil for gravel, but the best implement is generally a simple form of drill. There are cases in which gravel beds may be entered at the level of a stream bed, and water is thereby obtained for washing the metal by natural drainage, affording a cheaper means of freeing it from sand and earthy matter than by screening. Gravel is still being deposited in drifts and bars by the agency of streams; this will be found to partake of the character of the pit gravel of the locality but generally will contain less clay, although sand may easily be in excess. This is usually one of the best sources, as the gravel can be washed by natural drainage. Lake gravel is often a good metal but varies greatly. It is apt to be slatey, an undesirable quality, It will be free from dirt and clay, but contains sufficient sharp sand to secure consolidation, especially if a roller is used. Gravel which retains a perpendicular face in the spring, and shows no trace of slipping when thawing out may generally be assumed to be sufficiently clean and free from clay for use on the road without any treatment other than is necessary to remove stones greater than one inch and a quarter in diameter.

Broken Stone.

There are localities in Canada where good gravel is not obtainable, but where stone can be had, either as bed rock or as field boulders. Some townships have used stone broken by hand, but a stone crusher, with a screen attachment affords a much cheaper method.

The stone should be separated into grades according to size, the coarser stone to be placed in bottom of the road, and the finer at the top. This grading of the stone is done by means of the screen attachment. If the stones are placed in the road without being graded in this manner, the smaller stones wear more rapidly than the larger, and a rough surface results. Large stones at the surface, moreover, are more apt to become loose, to roll under the horses' feet or the wheels. For a country road there should be placed in the roadbed (1) a layer of stones such as will pass through a 2½ inch ring; (2) on this a layer of stones such as will pass through a one inch ring; (3) on this a coating of screenings—that is, the dust and chips created in crushing.

Care must be taken in choosing the stone to be used. Some limestones make good metal; but limestone shales of a slatey nature, or limestones which decay rapidly on exposure to the air should be rejected. Sandstones are brittle and do not unite well in the road. Granites, which are found in the northern parts of Ontario, make good road metal. Trap rock is the best obtainable. Gneiss is very frequently a good rock. The latter with other hardstones, are frequently found as boulders scattered over the southern parts of Canada. In using field boulders, care must be taken to reject such stones as are evidently softened by exposure. Rocks which crumble readily under successive blows of a hammer, or which show iron stains when broken, should be discarded. A little experience will quickly teach a judicious roadman to detect boulderstone which is unfit for road purposes.

There must be a sufficient body of broken stone to consolidate into a compact layer. A sprinkling of stones over the surface is useless. It merely impedes travel on what might otherwise be a good dirt road. Six inches of broken stone is the least which should be used in making a durable roadway for any purpose, and it should be the aim of councils to thicken this covering as circumstances will permit.

PLACING THE ROAD METAL.

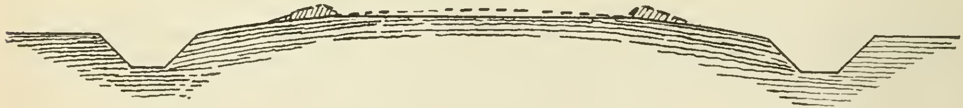
To know how gravel or stone should be placed on the road, it is necessary to have a knowledge of why it is placed on the road. This is a matter to which very few of our road-makers have given the slightest attention, and very few could give an intelligent answer to the question. The popular idea is that the stone makes a sort of carpet for a while, in a short time it will be forced down into the soil to form a bottom and on this more gravel or stone will have to be placed, and that this process will have to be continued indefinately until a good road is made. There is even a very general belief that it is not necessary to drain a road, but that the only means of accomplishing the desired end is to pile on gravel year after year, and that water, unless it actually floods over the top of the road, has little to do with the matter, and that so long as the actual surface of the road does not get wet it does not matter how boggy it may be underneath.

In the intelligent construction of a road, the intention of the gravel or stone coating is to form a waterproof covering for the soil undernerth as well as to form a hard wearing surface. Of course, gravel and broken stone can not, as a matter of fact, be entirely impervious, but so far as the coating of these materials does prevent the water passing through to the sub-soil, it fulfills the greatest portion of its mission.

To accomplish this to the greatest possible extent there are several points which it is necessary to pay attention to: (1) The road must be crowned or rounded up in the centre. (2) The material must be as compact and solid as possible. (3) The surface of the road must be smooth.

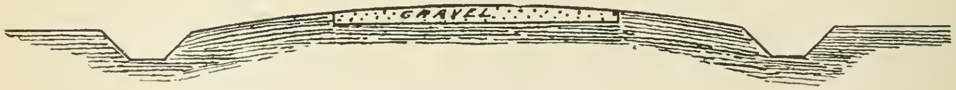
CROWNING THE ROAD.

By having the road crowned or rounded up in the centre, water is at once thrown to the sides where it can be carried away in the drains. If the road is flat on top, or if hollow, as many of the roads of Canada are, water stands on the road, soaks down through the road covering and softens the soil beneath. Then the trouble begins. There is nothing to support the gravel, so that when a loaded vehicle passes over it the wheels are forced down through the gravel and into the soil. The soil is plowed up, mixed with the gravel, and the serviceability of the road is largely destroyed.



"TURNING THE LOOSENED DIRT TO THE SIDE."

The means of providing a proper crown must depend on circumstances. For an average country road on which a grading machine is used, the best method will be to first round up the natural soil giving it a slightly less crown than it is intended the finished road shall have. This completed, pass the grader over one side of the centre cutting off the top and turning the loosened dirt to the side, then pass the grader back along the other side turning the loosened dirt to the side. This will leave a flat surface in the centre of the roadway, along each side of which is a shoulder of loose earth, forming a shallow trench. In this the gravel should be placed, spread with a rounded surface and the loose dirt at the sides levelled off to conform to the shape of the roadway.



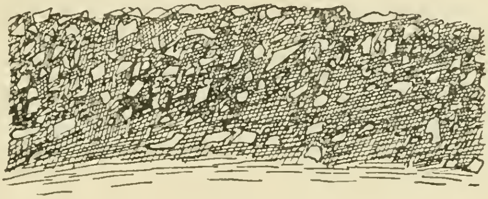
THE GRAVEL IN PLACE.

Old gravel roads are commonly flat, in ridges, with square shoulders at the edge of the ditches. In this case the better plan is to cut off these shoulders throwing the loosened earth outward. The ditches are usually very wide and flat, the road having been graded by drawing the earth out of the ditches with a scraper, so that the shoulders thus turned outward merely widen the graded roadway without interfering with the drain. If, however, these ditches are sharp and deep, the loosened earth may drop down so as to obstruct the water, in which case it will have to be thrown across the drain to the roadside by hand, a proceeding seldom necessary.

Usually a sufficient depth of gravel will be found upon these roads, requiring only that the centre should be raised by cutting off the sides. After this is done as above described, a light coating of clean gravel to fill the ruts and depressions and restore the crown will make an excellent road.

CONSOLIDATING THE MATERIAL.

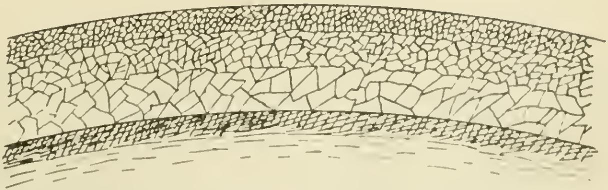
The road covering should be solid and compact in order to shed the water. Under present methods, the gravel or stone is dumped in the centre of the road and is left as it falls, a mound of loose material, avoided by the users of the road until late in the fall when the muddy and rutted state of the side of the road compels them to drive along this mound. Gradually it is flattened down and after a year or so, during which time it has been mixed largely with the soil beneath, it assumes the shape of a road. The utility of roads made in this way is largely wasted. Roads must be made for traffic not by it.



"MIXED WITH THE SOIL BENEATH."

This loose stuff absorbs the rain as it falls even before it is cut into ridges by wheels and the feet of horses. When it has been cut into this condition it acts as a receptacle to hold all the moisture its surface will receive. In this way the whole surface and foundation of the road is softened, is readily cut up and destroyed.

The best remedy for this waste in road-making, is to spread the road metal to conform to the required surface of the finished road, and then thoroughly consolidate it by the use of a heavy roller. It can be largely remedied also by taking proper care of the road, if a roller cannot be had. By raking the loose material into the ruts and wheel tracks as fast as they appear, nearly the same end will be accomplished but less perfectly and requiring a longer time. The first vehicle passing over the road does comparatively little injury; it is when ruts have been formed which hold water and other wheels follow in these tracks that the greatest damage is done.



THE BROKEN STONE IS CONSOLIDATED INTO A DISTINCT COATING BY THE USE OF A ROLLER.

A SMOOTH SURFACE.

It is evident that a smooth surface is essential to a good road. A rough surface is necessarily such as will impede the flow of water from the centre to the drains. To such roads rain is always an injury. With roads properly built, on the contrary, a good dash of rain will flush away the dust which has accumulated, and which, if it remains on the road in time of steady rain and slush, acts as a sponge to absorb moisture and soften the surface of the road.

KEEP THE ROAD DRY.

Keep the roads dry, and with very little attention they will remain good roads. A little moisture does comparatively little injury. Against some moisture it is impossible to guard. But with proper precautions the excess moisture can be removed before great damage is done. The means to be taken with regard to the actual surface of the road have already been commented upon.

THE OPEN DRAIN.

The open drains at the sides of the road should be sufficiently deep to hold water in times of freshets, and should have a sufficient fall to carry it quickly away. The fall should be uniform, not a series of rises and falls, knolls and holes.

Most important of all, in view of the neglect which it receives, the outlet must be ample and always free from obstruction. It is useless to dig a drain without providing an outlet for the water, a thing very commonly done. The water merely stands in the trench, soaks into and softens the roadbed. Unless a drain carries the water away it is useless.

THE FOUNDATION.

The importance of keeping the roadbed dry cannot be too thoroughly impressed. Clay in thick beds, when dry, will support from four to six tons per square foot of surface, according to the quality of the clay. If only moderately dry it will support only from two to four tons per square foot of surface. If the clay is wet and soft it will yield to almost any load. Gravel, if well compacted, forms a much stronger roadbed, is less yielding to the action of moisture, and for this reason, even for a thin surface coating, strengthens the road somewhat. But the real strength of the road must lie in the subsoil. Vegetable moulds and alluvial soils are weak, having a substaining power of only one-half to one ton per square foot, and for this reason it is well to remove such soils, securing, if possible, a gravel, clay or sand foundation.

UNDERDRAINING.

In order to keep the roadbed dry and secure a strong foundation, it is frequently advisable to use tile underdrains. Owing to the weakening effect of water on clay, also to the retentive nature of clay, that soil is usually most in need of underdrainage. In gravel and sand water is not ordinarily so destructive unless when acted upon by frost; at the same time these latter soils usually provide better natural underdrainage, as they are more porous, and artificial means of underdrainage are usually less necessary.

Under-drainage may be had by means of common field tile. It is usually best to place two such drains, one on each side of the roadway underneath the open drains. One tile drain placed underneath the centre of the roadbed is sometimes used. The extra cost of two drains is largely reduced, however, by the lesser cost of excavation, since, on the majority of road allowances, deep open drains now exist, and the soil is softer and more cheaply handled than that in the hardened centre of the road. It is very unwise to excavate and soften the hardened centre of the road when it can be avoided, as settlement is very slow. At the same time, two drains are more effective, carrying away water more rapidly and thoroughly. They intercept the soakage water from the adjoining land before it passes under the roadbed.

Any thoughtful farmer who knows the effect of underdraining in his field will at once recognize its usefulness in road-making. In the fall, water will be rapidly removed from the bed of the road and the destructive action of frost lessened. In the spring the frost will come out of the ground more quickly, and each of those periods in fall and spring are shortened, when, with the foundation and surface thoroughly saturated, the roads are not only impassible on account of the mud, but are injured by traffic more than in all the remaining nine or ten months of the year. One year's statute labor with the annual appropriation, spent in providing proper drains for the roads of the Province would do more than can be done in five years with the present method of merely filling the holes which appear, with gravel or crushed stone.

Underdraining and grading should be carried on simultaneously. Unless drained, the traffic during the ensuing autumn and spring will usually leave a graded road as shapeless and rough as a pioneer wagon track can be. If drained, there will be a foundation for the gravel or crushed stone to rest on when applied.

A porous soil, like a sponge, retains in its texture, by attraction, a certain amount of water. When water in excess of this is added it sinks to the first impenetrable strata, and from there it rises higher and higher until it finds a lateral outlet; just as water poured into a pail will rise higher and higher until it finds an outlet in the side of the pail, or until it flows over the top. Underdraining supplies the necessary outlet for this excess moisture at a proper depth from the surface; " it lowers the water line."

With plastic clays the process is slightly different. Clay will absorb nearly one-half its bulk and weight of water. In drying it shrinks and is torn in different directions. The fissures thus commenced by a tile drain become new drains to lead water to the tile; and so the process of contracting and cracking continues until a net work of fissures is produced, and the stiffest clay is thereby drained.

The Effect of Frost.

The injury done to roads by frost is caused entirely by the presence of water. Water expands on freezing, and the more there is under a road, and above frost line, the greater is the injury. The particles of soil in immediate contact with the water are first conpacted. When room for expansion ceases within the body of the soil itself, the surface is upheaved. When thawing takes place the sub-soil will be found honey-combed, ready to settle and sink beneath traffic. It is therefore of the utmost importance that the soil should be relieved of the water of saturation as quickly as possible by underdrainage. The impassable condition of most roads in Canada during the spring, often axle deep in mud, is to be attributed very largely to a wet sub-soil which has been honey-combed by frost.

Maintenance.

It is not merely necessary to make the roads good; they must be kept good. It is not sufficient to provide drains; care must be exercised to keep the drains open and free from obstructions. It is not enough to merely place the gravel or broken stone on the road as it ought to be placed; care must be taken to see that the covering is kept in place. It is not sufficient to build culverts; it is further necessary that the culverts be kept in order. It is folly to build roads properly if they are afterwards neglected and allowed to remain out of repair. Every farmer knows that if the repair of his barns, his outhouses, and his fences were neglected as is the repair of the roads, a great personal loss would result.

Probably one of the greatest defects of the present system of road construction is that the roads are not repaired when the need of repair first arises. Unless in a very dangerous state, work is done on the roads only once a year at the time of performing statute labor; ruts, hollows and other defects are permitted to remain without attention, and when these defects commence they increase with great rapidity. Culverts are permitted to fall to pieces for want of repair at the proper time. Drains become obstructed, and the roadway is allowed to be flooded and saturated for want of a little timely attention.

It is absolutely essential to the maintenance of a good and economical system of roads that provision be made by the township for their repair as soon as signs of wear appear. However extravagant it may appear at first sight to recommend that a man be constantly employed to go over such a mileage of roads as he can attend to, devoting his whole time to the work, there can be no doubt that it would in the end be the most economical plan. It is the same system pursued by railways in the care of their roadbed, and railway corporations are noted for their economical methods.

A man constantly employed in this way could fill up ruts and wheel tracks as soon as they appear, before water has been permitted to stand in them to assist in deepening them. A decayed plank would be removed from the culvert or bridge before an accident was caused thereby, and before the weakening of the bridge at this point had caused other portions to be destroyed. An obstructed drain would be opened before injury had resulted to the roadway. Loose stones would be removed from the road where they are rolling under the wheels and feet of horses. Loose gravel and stone would be kept raked into place until it had become consolidated. By these and many other simple means the roads would be at all times kept in a more serviceable condition, and of greater importance, repairs would be made in time to save the road from injury which could not be remedied; and in time to save much labor and expense in making possible repairs.

Some municipalities have adopted the plan of employing a foreman and a couple of laborers to devote their whole time to the roads of a district or township, and in such cases a grader and other road machinery is employed. Whatever the details of the system, the principle should be the same throughout, that wear must be repaired as soon as signs of it appear, if economy and good service are to be had.

ROAD GRADERS.

A road grader is one of the most necessary implements for a township to possess. To depend upon manual labor for the first grading of roads, and the repair of others that require re-shaping, is a useless waste of labor and money. Improved road machinery is as great a saving in road-making as is the self-binder or the steam thresher in farming operations. To neglect the use of a road grader is as unwise as it would be to return to the old time cradle and flail. If every ratepayer took the same personal interest in the roads that he does in his farm, no municipalities would be without modern machinery for roadwork. The grader in the hands of a skilful operator will do the work of fifty to seventy-five men in grading and levelling the roadway.

A ROAD ROLLER.

A most valuable implement in road construction is the road roller. On town streets it is indispensible. To thoroughly consolidate the gravel or stone into a smooth, hard layer, before it can be mixed up with the sub-soil, renders the surface coating more durable and serviceable in every way. A steam roller of ten tons is too expensive for the majority of rural municipalities, but in some instances, townships could rent from a town in the district which owns one. A horse roller of six or eight tons is less expensive and some municipalities may see fit to purchase. In the construction of broken stone roads the loose stone consolidates under traffic less readily than does gravel, and without rolling remains for some time very loose and rough.

A Stone Crusher

Wherever good gravel cannot be had, and where stone for crushing is obtainable, a stone crusher is most useful. Stone can be broken by this means at a price within the range of every well populated township, although a very expensive work when performed by hand. A crusher can be operated by the steam engine used for a threshing machine, which can generally be rented.

A rotary screen attached to the crusher will separate the stone into grades according to size, ready to be placed on the road in layers, the coarser in the bottom of the road.

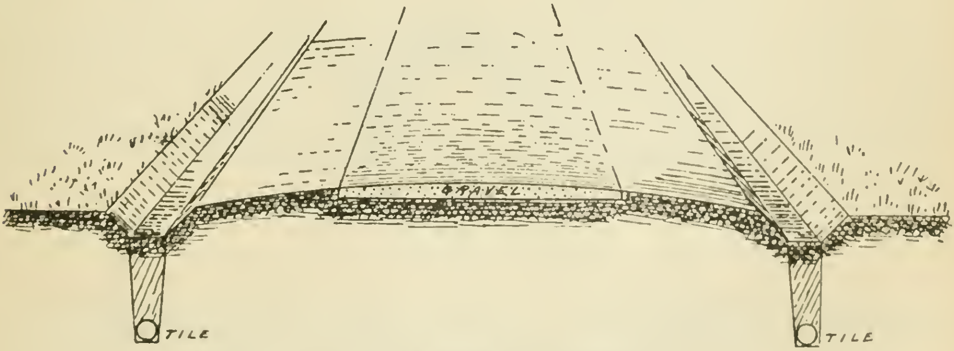
Wagon Tires.

It would seem as though in everything the present methods in regard to roads in Ontario are contrary to good judgment. Gravel or broken stone is dumped loosely, without even spreading, on a badly graded, badly drained sub-soil. In the use of these roads the same recklessness is glaringly apparent. When wide tires have universally replaced the narrow tires which are now found on farm wagons, a great part of the road question will be solved. Narrow tires of two and one-half inches in width have only one-half of the bearing on the road which would be provided by tires of proper width. By referring to the supporting power of soils discussed in the paragraph on "Foundations," the effect of this is more apparent. By the use of a six inch tire, the roadway will support, without yielding, twice the load which it could support with a three inch tire.

Narrow tires cannot be too strongly condemned. They cut and grind the road, plow and upheave it. Wide tires, on the contrary, are a benefit rather than an injury to the road, inasmuch as they act as rollers to preserve a smooth, hard surface. In some localities wide tires are objected to under the argument that they increase the draft required to move the load. This may occur under certain occasional conditions of very wet and soft roads. But when wide tires are universally used this objection will disappear, as the increased draft is due to the ruts and mud caused by narrow tires.

Dimensions of Roads.

For the average country road, a graded roadway twenty-four feet in width between the inside edges of the open drains, will be ample to accommodate travel. For the average road, if the central eight feet is metalled with gravel or broken stone, it will be sufficient. The depth and width of the open drains will have to be governed by circumstances. Sufficient capacity must be provided to carry away all surface water. The depth must be dependent also on the fall obtainable. With tile under drains, deep open



"For the Average Country Road."

ditches are not needed to drain the road foundation. The use of tile does away with the deep and dangerous open ditches which may otherwise be necessary. The crown of the road should be such as to give a fall of one inch to the foot from the centre to the edge of the ditch.

Hills.

Hills are among the difficult portions of the road to construct, and are a constant source of expense for repairs. The reason of this usually is, that the drainage is imperfect. Water is brought long distances in open drains by the roadside, and poured over the hills, frequently to flood over the whole surface. It is not uncommon to find the centre of the road over the hill lower than open drains at its side—if there are drains at all. The natural result is that washouts are constantly occurring. For conditions of this kind the simple remedy is to dispose of the water before it reaches the hill, by conveying it through the adjoining fields if necessary. The probability is that a great amount of water has been carried in deep ditches past watercourse after watercourse in order to dispose of it over the hill, thereby avoiding the necessity of constructing drains through farm land in the natural watercourses. The secret of successful drainage with respect to roads, is to dispose of water in small quantities before it can gain force and headway.

Another common occurrence is to find water oozing from the surface of the road on hills. This is especially noticeable after the frost leaves these spots. The surface is soft and spongy and is cut readily by wheels. Such hills should be drained by placing a line of tile down each side of the roadway between the gutter and the gravel, carrying these underdrains to proper outlets. Cross drains should be laid in the wet spot leading to the side underdrains in a diagonal course. Well concaved gutters should be made on each side of the roadway, and at regular intervals catch basins should be placed to arrest the flow of water in these gutters, leading it into the tile underdrains.

The roadway on a hill should be well crowned. This will draw the water quickly to the drains at the side of the road, instead of permitting it to follow the wheel tracks, deepening them to ruts.

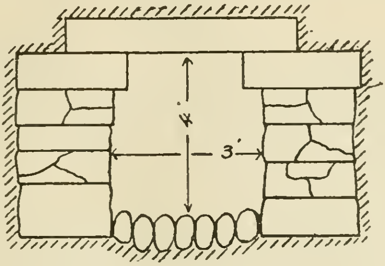
Location of Roads.

There are very many instances where, by changing the course of a road slightly, municipalities would save a large sum in construction, and at the same time produce a better road. A slight deviation would frequently avoid swampy or wet ground, or would do away with the necessity of expensive cuts and fills. A hill can sometimes be avoided or the grade very much reduced by altering the location of the road. There is a prejudice against taking the roads from the lines laid down in the original survey, and property owners prefer to have their farms bounded by straight lines. At the same time the value of good roads to the farm should not be overlooked, and whenever a change in the road allowance means the change from a bad to a good road, or a change from a steep to a gentle grade, the slight inconvenience created by the alteration of boundary lines will be many times repaid.

Culverts.

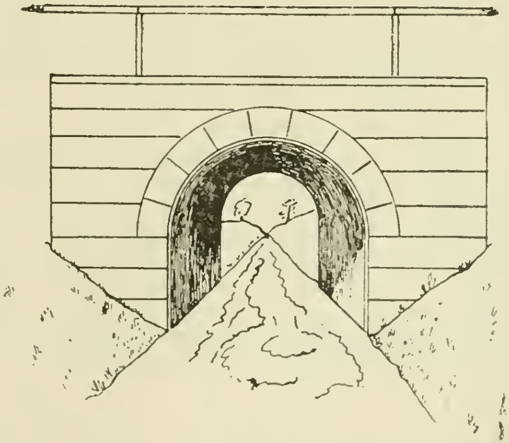
In no branch of municipal work is so much money wasted as in the construction and maintenance of sluices and culverts. In most townships these are built of timber.

Timber is perishable, culverts are subjected to repeated changes of wet and dry weather, the severest test to which timber could be subjected. Each year a large number of these culverts are renewed at a cost of from $5 to $50 each, in some townships aggregating from $500 to $1,500, and this is an annual outlay. The life of these structures is so short that it is not more than five years before repairs are required, and these repairs in a short time amount almost to renewal, and that of the most expensive kind. A broken plank, or stringer, a rotten log or any timber replaced with new at different periods, makes the maintenance very costly, and this class of structure the most temporary and expensive. No sooner have they all been rebuilt than we must again commence the reconstruction of the first; in this way the expenditure becomes perpetual, and fixes a large percentage of our annual tax. If these culverts are in their proper locations, natural watercourses and other fixed places, they will always be required, and their construction in the most durable manner is the best and most economical plan.



For some Localities a Cheap, Stone Culvert of this Design will Answer.

For small culverts there is very little difference in the cost of timber and vitrified pipe. If properly laid the latter will withstand the frost and is durable. These pipes may be used up to eighteen inches in diameter, and the capacity may be increased by laying two or more rows, but the pipes should have at least one foot of earth or other filling between them. Culverts of five or ten feet span should be cement-concrete arches, which is permanent if the concrete is properly made. The concrete should be composed of first-class cement, clean, sharp, silicious sand, free from earthy particles and course enough to pass through a twenty mesh, and be retained on a thirty mesh sieve; clean gravel screened through an inch and a half screen, the largest stones to be not more than two and one-half inches in diameter; or, in place of gravel, broken stones that will pass through a two and one-half inch ring. These materials should be mixed in the proportion of one cubic foot of cement, two cubic feet of sand and three cubic feet of gravel or broken stone, with just enough water to make the whole into a plastic mass. The sand and cement must be first mixed dry, then a sufficient quantity of water added to make it



A Concrete Culvert with Wing-Walls of Concrete.

into a thick paste. It should then be thoroughly mixed again, spread out, the stone or gravel added, and the whole thoroughly mixed until every stone is coated with the mortar, then put it in place. The walls should extend well below the frost line and have a wing at the ends to protect the embankment from wash.

BRIDGES.

Wooden bridges, except where timber is very plentiful in the immediate locality, are not a good investment in view of the reduced cost of iron and steel, and the increasing cost of timber. Timber decays quickly, and while cheaper than steel in first cost, is more expensive after a term of years, since the cost of repairs is very great.

Generally speaking, the cost of an iron superstructure is more than that of wood. The substructure of stone or concrete is more expensive than pile or crib work, but as in other structures, a firm foundation is most serviceable and economical. Wooden foundations, from decay and other causes, settle, and the least settlement in the foundation twists the timber, causing a disarrangement of the strains, frequently transferring the greatest load to the weakest point. Wherever timbers have a seat or bearing exposed, decay soon commences, and when least expected the bridge collapses under a heavy load.

Wherever timber is used in bridges it should be in members of from four to six inches in thickness, the strength of the beam or cord being obtained by building several members together, breaking joints, and coating each bearing with lead. A further protection is to cover these built timbers with galvanized iron to protect the numerous joints and bearings from moisture. All caps, corbles, chords, braces and floor beams should be made in this way so that the thickness of no timber will be more than six inches. A wooden bridge should be painted one year after erection; an iron bridge at the time of erection, and care should be taken to see that they are kept painted and that all nuts are kept tightened so that each member may carry its fair share of the load.

The cost of renewing a wooden bridge, in which a man has to be sent to put in a new timber from time to time, will amount to twice the initial cost of the bridge. In this way the ultimate cost of a timber structure becomes very great.

The course pursued by some, indeed most municipalities, in erecting iron bridges is likely, however, to result disastrously, and throw iron and steel into disrepute. A council advertises for tenders. The companies responding supply their own plans and specifications. Thus far the procedure is entirely satisfactory. The difficulty arises when councils accept the lowest tender without obtaining the advice of an experienced builder of iron bridges as to the plans and specifications submitted. This is a matter in which few township engineers and surveyors are qualified to decide, and certainly the wisdom of councillors entirely without professional training in such matters is not to be trusted. Cases have occured in which a difference of five dollars has influenced a council to accept a tender for a bridge which was manifestly, to a man of experience, worth less than the other by several hundred dollars; and which was indeed unsafe, offering every likelihood of failure with attendant loss of life and great expense for reconstruction. It is difficult to understand the action of councillors, shrewd in other matters, in the construction of bridges and other public works proceeding with such apparent disregard for the true interests of those whom they represent. A small sum spent in securing reliable advice is as much a matter of economy in public as in private affairs.

IN BRIEF.

Roads that "break up" are bad roads.

Make road improvements in such a way that they will be permanent.

Whether by statute labor or other means undertake road work systematically.

Appoint a supervisor who will have charge of all the road work

Make road beats five miles in length, choose the best men as pathmasters, and keep them in office.

Classify the roads according to the nature and extent of traffic over them.

Specify the width of grade, amount of crown, plan of drainage, kind, width and depth of material to be used, and see that these specifications are carried out.

Purchase gravel by the pit, not by the load.

Use clean road material.

Strip the clay and earth from over the gravel pit before the time of performing statute labor.

If screening or crushing is necessary let this be done before the time of statute labor.

Do not scatter money in making trifling repairs to temporary structures.

If statute labor is to be made successful the work must be systematically planned and some definite end kept in view.

Have the work properly laid out before the day appointed to commence work. Call out only a sufficient number of men and teams to properly carry out the work in hand and notify them of the implements each will be required to bring.

Let no pathmaster return a ratepayer's statute labor as performed unless it has been done to his satisfaction.

In justice to others, make the returns clearly, showing what work has not been done.

See that the council collects the amount from the delinquent parties and have it expended the next year.

The pathmaster should inspect the roads under his charge after every heavy rainstorm. A few minutes' work in freeing drains from obstructions, filling holes, diverting a current of water may amount to several days' work if neglected.

With the money which can be spent, build permanent culverts, permanent bridges, buy machinery, buy gravel pits, prepare gravel for hauling, construct drains, operate the machinery.

Use the statute labor as far as possible in drawing gravel or broken stone.

Do not leave the gravel or broken stone just as it drops from the wagon. Spread the metal.

Crown the road with a rise of one inch to the foot from side to centre so as to shed water from the roadway to the drains.

Give the open drains a good fall to a free outlet. Lay tile underdrains where needed.

Drain thoroughly. Keep the road surface dry. Keep the earth underneath the surface dry.

Use road machinery.

Use graders, stone crushers and road rollers.

Improved machinery is as necessary for good and economical work as are self-binders and steam-threshers.

Employ a man to take charge of the machinery. He will become experienced and do better and cheaper work.

The same teams should be employed to operate the graders. They become accustomed to the work and give better service.

Do not cover an old gravel road with sod and earth from the sides of the road. Turn this earth and sod outward and raise the centre with new gravel.

Adopt every means to secure a hard, smooth, water-proof surface.

Do not let stones roll loosely on the road.

Do not let ruts remain. They make travelling difficult, and spoil the road by holding water.

Make repairs as soon as the defects appear.

Use wide tires.

Improve the drainage of the hills. Make the crown of the roadway higher than on level ground.

Change the location of the road if a steep hill can be avoided.

Do not use wood for culverts. Use concrete, vitrified pipe or stone.

Do not build wooden bridges. Use iron, stone or concrete.

Build good roads.

THE GOOD ROADS MOVEMENT.

The demand for better roads is one which is far reaching and urgent. From Nova Scotia to British Columbia the question is being discussed and active measures are being taken to place road improvement on a more satisfactory basis. Throughout Canada statute labor still prevails but in all the provinces evidence is not lacking to show that a change in this regard will take place within a short term of years. It is not a matter in which any of the legislatures are likely to interfere until the people themselves make such changes as the power with which they are now vested permits. The legislatures are, however, using educational means to influence the people to better their condition in this respect. Ontario and Quebec have appointed commissioners for this purpose. In New Brunswick and Quebec the provincial governments are granting aid to the Good Roads Associations and in the actual construction of roads, chiefly, as yet, for educational purposes. In Nova Scotia measures are being advanced leading to the expenditure of Provincial grants, and to regulating the width of waggon tires. Manitoba has as yet taken no active steps, but in the North West Territories organization has been given to a statute labor law and in British Columbia the agitation is brisk.

The movement has grown out of actual conditions. The roads are bad. They are the result of a certain system. That system is therefore insufficient, and better methods are being sought. There is no desire on the part of any to increase taxation. The reverse is entirely the case. But where taxation may be increased to a slight extent, it is claimed, and fully substantiated, that the amount of taxation is many times made up by profit derived from the improved roads. The movement is on a firm basis, is one which is supported by the best economic principles borne out by the experience of other countries.

The possibilities of agriculture in Canada are unsurpassed by those of any country of the world. A comparatively small proportion of our land available for farming purposes, is under cultivation ; and such lands as are under cultivation are rarely productive to the full extent of their ability. To enable us to receive the greatest advantage from the resources surrounding us, there is every need that the portion of the community engaged in farming shall be provided with the best machinery of agriculture. This does not consist merely in the seeders that assist in sowing ; the threshers that separate the wheat from the chaff. To obtain sale for his produce at the highest price is equally important for the farmer with raising his produce cheaply and of the best quality. The former, however, is a matter which the farmers have too long neglected, too long left to the good will of others. The real market of the Canadian farmer is not the railway station or country town where he delivers his produce. The price of the article is fixed at the great distributing centres in accordance with law of supply and demand. The amount received by the farmer is the price at the distributing centres, less the cost of transportation. To realize increased profits, the farmer must produce more cheaply and transport more cheaply. The first part of the carriage is entirely in the farmer's hands.

The first link in the chain of transportation, the country road, is abnormally expensive and inefficient. To remedy this is to assist very materially in improving agricultural conditions, and in a great measure increase the prosperity of the country as a whole. There is not an industry nor profession which would not be benefited by good roads, for the basis of Canada's wealth is agriculture. The State of Massachusetts is one of those which has taken most advanced steps in road improvement. On petition of a county, the State road commission may, with the assent of the Legislature, adopt any road within the county as a State highway. Except that the grading and bridging is done by the county, the work thereafter, both construction and maintenance, is under the authority of the state commission. Also on petition of two or more cities or towns, a road between them may be made a state highway. The "State Commission" is composed of three commissioners who compile statistics, make investigations, advise regarding road construction and maintenance, and hold public meetings for the discussion of road matters. One-fourth the cost of construction is paid by the county, the remaining three-fourths being paid by the State. In 1894, the State spent $300,000 in this way; in 1895, $400,000; and in 1896, $600,000. It is intended that ultimately about one- tenth of the entire road mileage shall be built in this way.

In Michigan, upon a majority vote of the ratepayers in any county, a county road system may be adopted. A board of commissioners, five in number, are elected by the people to lay out, and construct certain of the leading roads, to be paid for and thereafter maintained by a county rate.

A bill has just passed the New York State Legislature providing that, on petition of a county council, certain roads may be adopted as state roads. The petition is first presented to the State Engineer. If he approves of the section of road thus sought to be improved, he prepares plans, specifications and estimates. These are presented to the legislature and if approved by that body, fifty per cent. of the cost of construction is paid by the state.

The New Jersey Highway Law provides that, on the petition of the owners of two-thirds of the land bordering on a road, the state Commissioner of Public Roads will cause the road to be improved in accordance with plans and specifications prepared by him subject to the approval of the Legislature. The owners of the land affected by the improvement pay one-tenth of the cost; the county pays six-tenths; and the state three-tenths.

Connecticut has introduced a plan of highway improvement providing for the appointment of three state commissioners. When a township votes in favor of constructing a road under the provisions of the State Highway Act, specifications are prepared and submitted to the state commissioners. If the commission approves, the township council lets contracts for the work to be performed under the supervision of the state commissioners. One-third of the cost is paid by the state; one-third by the county; and one-third by the township. The expenditure by the state in this way is limited to $75,000 annually.

The State of Rhode Island has appointed a Commissioner of Highways. When a council represents to the Commissioner the need for improving a certain road, an examination is made by him. If he considers the work necessary he prepares plans, specifications and estimates, and reports to the municipalities affected, also to the State Legislature as to the proportion in which the expense should be met by the state, and the municipalities benefited. If the State Legislature approves, the work is performed by contract.

Vermont and California also contribute largely in the form of state aid, while Indiana, Kentucky and others contribute in a less degree. Only the bare outlines of the systems have been stated with the object of showing the prominence the question of road improvement has attained of recent years. All the above legislation has been adopted within the past five years. In all these systems safeguards are placed to prevent the expenditure exceeding, for any state or any locality, certain reasonable limits, according to requirements and ability to meet the payments. In most of these states, the tax is so levied that the towns and cities pay the greater proportion of the cost of state road construction ; for example, in the State of New York, it is estimated that the people outside of the towns and cities will pay only 10% of the cost.

The last report of the Wisconsin League for good roads concludes with the following summary :—

"Interest in the crusade for better roads has again made great progress during the past year. Road machines are multiplying in number, better methods are gradually being adopted, the sentiment for substantial macadam roads is growing rapidly, and it may truly be said that the work of the League for Good Roads during the past two years has borne fruit. Still, only a beginning has been made during those two years. We must continue in our efforts to bring about state aid to road building, which is the best practical method of securing the construction of short pieces of model road in each country, to serve as object lessons. Such pieces of roads would serve to teach the practical value of substantial highways, and would give a wonderful impetus to the good roads sentiments. State aid to roads is employed in New Jersey, in Connecticut, Washington, Rhode Island, Vermont and Massachusetts. Public sentiment in Wisconsin seems to be drifting to state aid as the most practical reform in connection with road building. Our league has the heartiest co-operation of the farmer's institutes the agricultural societies, the public press, and of many organizations whose character permits them to aid in our work. With the continued assistance of our members who have manifested their interest upon numerous occasions, we believe confidently that our organization will continue to succeed in its labors as heretofore."

The inducements offered to municipalities by the Provincial Government of Quebec, are stated in a circular issued from the Department of Agriculture. While the means adopted may in a measure be termed "state aid," they in effect are similar to those of Ontario, in as much as they encourage the people themselves to undertake the work ; are educative in results, rather than affording substantial assistance such as is generally understood by "state aid." The circular is as follows :—

"In 1897 the Department of Agriculture inaugurated a new policy for encouraging improvements to roads by granting aid to rural municipalities to enable them to purchase special machines for repairing roads.

Notwithstanding the bad weather that prevailed during the summer and last autumn, and was unfavorable for effecting repairs to roads, the results obtained have been most satisfactory. Seventy-seven municipalities have had their names entered so as to benefit by the advantage offered them, and according to the official reports received up to date at the Department of Agriculture, over 150 miles of road have been repaired since last June.

These results justify the Department in carrying out the system inaugurated last summer with the few following modifications :—

A special grant of $300 was placed last summer at the disposal of each county, to be divided into premiums of $125, $100 and $75 between the first three municipalities that availed themselves of the same. The same grant will be given this year to the counties which shall have claimed it in whole or part between this and the month of July next.

In counties where the total amount of $300 shall have been distributed between now and July, the Department will again grant from and after that date three premiums of $75 each to the first three municipalities applying for the same. If a single municipality in a county has then availed itself of the offer made to each county, the department will place at the disposal of the same county a bonus of $100 and two of $75.

Moreover, in order to encourage the stoning of roads, the Department has decided to grant each county municipality, aid towards the purchase of stone breakers with engine, roller, and sorter, provided that the total cost of such machines do not exceed $2,400 per county. An amendment to the Municipal Code, passed during the last session of the Legislature, authorizes county councils to make arrangements with each parish, village or town municipality of the same electoral division, for repairing the roads in those various municipalities. The general act respecting town corportions has likewise been amended in the same sense.

Municipal councils of parishes or of counties desiring to avail themselves of the above advantages must draw up their application in the form of a resolution, a copy whereof must be sent to the Department of Agriculture. The premium to which they shall be entitled shall be paid to them after at least two miles of earth road shall have been repaired, and after a certificate to that effect shall have been forwarded to the Department with a copy of the invoice from the company that sold them the machines.

In the case of the purchase of a stone crusher, half a mile of macadamized road must have been completed and accepted by an officer of the Department of Agriculture, before the Government contributions shall be paid.

Machines for repairing earth roads that are bought by the municipalities, with the help of the Government, shall remain the property of such municipalities for at least three years, and the county councils that purchase stone breakers cannot sell such machines before they have been at least five years in use in the same county."

MUNICIPAL REPORTS.

During the year an effort was made to secure reliable statistics from municipal clerks respecting roads and streets throughout the Province. The importance attached to the question of road and street improvement was evinced by the interest taken in the matter by municipal clerks. The replies to questions asked, in the great majority of cases, were painstaking, with an evident desire to give the fullest and most correct information. In spite of this, however, the lack of system which characterizes this branch of public work is so deplorable that nothing of a definite character, respecting the Province as a whole, can be tabulated. Very few municipalities have any records showing the number of miles of roadway to be maintained; some clerks could not even venture an approximate estimate. Scarcely a township could separate the expenditure on roads from that on bridges Rarely could a reliable answer be given as to the number of miles of road improved in any year, or the amount of work done. In regard to the general condition of roads in any municipality, the majority of clerks affirmed that they were bad. Others believe that their roads compare very favorably with those of adjoining townships—not always indicative, it is to be observed, of good roads.

In towns, very much the same condition prevails. Only an approximate estimate of the street mileage could be given. Many could not state the number of miles gravelled or otherwise improved. While they could give the total amount spent on roads, sidewalks and bridges, very few could separate the items under these heads; nor had they any record of the work done in any year.

If the roads had received any kind of systematic treatment whatever, these are all matters which could be known without difficulty. The result of the enquiry is a most emphatic avowal of the neglect which road improvement, under present methods, has received. Councils are spending money in amounts which are very often large, but no proper record of the expenditure is kept. The money is merely scattered in patchwork and temporary repairs, and at the end of the year, for one thousand dollars spent in this way, very rarely can satisfactory results be shown. A proper record of the money and labor placed on the highways, together with the work performed, if presented to the people would be an important factor in correcting many of the slip-shod methods which now prevail. The following is the circular sent to township clerks. Those sent to towns, cities and counties were of a similar nature:

DEPARTMENT OF AGRICULTURE, GOOD ROADS BRANCH, TORONTO, OCTOBER 11TH, 1897.

To the Clerk of......................

The information possessed by the Department respecting the roads of Ontario is of a very indefinite character; and in view of the importance of the subject, and the interest now being taken in road improvement, it is earnestly requested that you will favor the Department with replies to the questions in this circular. Kindly fill in the blanks as far as possible, and return in the enclosed envelope without sealing it. Any further particulars respecting the roads or road system of your municipality, not touched upon by the questions, will be gladly received.

A. W. CAMPBELL,
Provincial Instructor in Roadmaking.

1. What is the total road mileage maintained by the township ?

2. How many miles are metalled with gravel or broken stone ?

3. Is the road metal (gravel, stone, etc.) plentiful ? What is the average length of haul ? What is the quality ?

4. Is statute labor employed ?

5. What number of days' statute labor was on the rolls in 1896 ?

6. What is the number of pathmasters appointed ?

7. What is the commutation rate ?

8. What number of days were commuted in 1896 ?

9. Is commutation of statute labor compulsory ?

10. What amount of money was appropriated by the township for roads in 1896 ? For bridges ? Total.

11. Is any aid received from the county ? If so, what amount was received in 1896 ?

12. Were any actions for damages brought against the township in 1896 caused by defective highways ? What was paid by the township in verdict, fees or settlement ? Are any such actions now pending ?

13. What roadmaking implements or machines are owned by the township, and when were they purchased ?

14. What extent of road mileage was graded or otherwise improved in 1896 ? In 1897 ?

15. What is the general condition of the roads ? Has any special effort been made recently to improve them ?

16. Further particulars :

CITIES, TOWNS AND VILLAGES.

The following extracts from reports received from the clerks and engineers of cities, towns and villages are of interest, and contain very suggestive statements. Special reports were asked from certain municipalities, which are also given :

BARRIE.

In 1896 the Council of the Town of Barrie voted an appropriation for the purchase of machinery and the construction of macadam pavements.

In that year and the spring of 1897 there was constructed 7,050 yards of Telford and 20,000 yards of simple macadam.

Under the Telford, the sub-grade was a light loam and sand, and under the macadam pure sand for the greater part of the way.

Some years previously there had been a specification drawn up for a Telford road, estimated to cost $1.20 per square yard.

The authorities desired to put down a cheaper pavement, although there was no discussion as to discarding the Telford foundation.

The roadbed actually laid was a very substantial one, quite as heavy as the original design, but having cheaper features in the foundation and costing about half the estimated cost of the original.

The Foundation consisted of six to eight inches of field stone. The interstices were filled by the broken stone working into them. A large amount of broken stone was used in this way, but except where a swampy sub-grade or other reasons called for this procedure, I would not advise it, on the score of the attendant expense. It left a very open foundation no doubt and solid, but in general the gravel from the old roadbed might be hauled back to serve the purpose or else if that were not fairly clear, fresh pit gravel. This forms a good cushion also for the metal proper.

If excavation has to be made for the foundation, as would be the case in general on a built up business street, there is a certain amount of expense in that, but in cases the excavated earth serves as a fill, and where stone is as cheap as we had it here, the expense of the foundation, for stone and setting the same, is but a small proportion of the total cost. Here, this item amounted to about ten or eleven cents per square yard, but the excavation and the broken stone to fill the interstices added considerably to the outlay chargeable to this portion of the work.

After a small piece of the pavement had been finished a tremendous rain storm swept it as clean and smooth as a floor and caused a citizen "*agin the Government*," to remark "I do not mind paying for a thing when it is well done."

The Road Metal was then spread in three grades, coarse, medium and screenings. The medium grade is practically the wearing surface, as the screenings are intended for binding only, but were only used over the top layer. Water was used liberally with the fire hose where possible, otherwise with the water cart used for sprinkling the town streets.

The traffic was never stopped. The best piece of work was done, however, on a section of road where the traffic could be diverted and plenty of water laid on from a fire hydrant.

The intention was, on our work, to make the metal on the crown of the road six or seven inches thick after compacting, and the edges four or five inches. I think that this was approximately obtained. It is false economy not to grade the sub-grade carefully, as there is a waste of stone otherwise.

We estimated that the stone as measured in the wagons and as paid for ought to cover the roadway, if placed unbroken, to a depth of about ten inches, so that an allowance—say 66 per cent.—ought to be made in calculating the stone required for a given area.

The circumstances were such as to prevent any very exhaustive tests being made, but it would appear that the stone when broken and measured separately, increased very little in bulk. As has been mentioned, the greater part of the simple macadam was laid on pure sand.

It was difficult to maintain a decent cross-section, as the wagons and carts bringing the stone and the ordinary traffic cut into the sub-grade, the soft sand spreading out almost like water. Generally, however, a thin crust was formed by spreading clay, gravel or sharp sand, as it could be obtained, and often the loam underneath the sods at the roadside, where cuts were made was spread over the sand, but when the expense of this is likely to be at all large, I would not advise it. Even if the lower stratum of metal is to some extent buried in sand, there is the weight and solidity of the stone to the good.

The stone placed as this soft sand was rather course and had a good many spalls amongst it. We considered that, owing to the soft bed, these spalls were not very objectionable. When the jaws, crushing plates or dies are worn a good deal, there is apt to be a large proportion of flat pieces. These can be broken by napping hammers, and should be broken if they do not rest directly on a soft bed such as I have described.

A new set of jaws will help the difficulty of spalls, of which, however, there will always be some, and the napping hammers will always be in requisition for the upper course at least.

Engineering. To provide ample time for preparing careful plans is common sense. Due notification to the corporation of changes of grade affecting properties will give them time to act expediently. A good deal more of the construction engineer should be seen on the road than was arranged for in our work. Engineering cost money to the client, but the expenditure is conservative and legitimate and always tends to saving in the end, often of large sums.

The Cost of pavements of this kind must differ widely according to the locality. The cost of the stone and of breaking it are factors, and these vary considerably—the first to the greatest degree.

We found that the 4,220 square yards of simple macadam constructed in the spring of 1897 cost thirty-three cents per square yard, including all repairs to machinery, oil, waste, etc., etc., and crushing plates, but not including depreciation, interest on capital, nor engineering. The excavation was not responsible for more than two cents per square yard. The amount to add for depreciation and interest might be estimated roughly at two cents per square yard on the supposition that say 15,000 square yards were laid per annum. See also under "Machinery" for cost.

Cleaning. The pavement on the main street has been swept by hand, a large stable broom having been used, with shovel and hand scraper, no labor-saving machinery having been purchased.

Expensive as this method is, the road lasts well under it, as it is dealt gently with. The low spots are kept filled and prevented from being worn deeper, while the whole roadway is left covered with a very light crust protecting the stone from abrasion.

The crust would be dust except for the use of the water cart, which is thus an important factor in the preservation of the pavement.

Gutter. A cobble stone gutter about four feet wide is perhaps the best and most economical to edge the roadway with in small towns. The cost will be from twenty-five to thirty cents per square yard if not grouted with cement. One advantage of cement is that grass cannot grow in the interstices ; the removal of which from the gutter on streets of little traffic being an item of expense ; otherwise, however, the gutter seems amply stable under the light vehicular traffic of small towns.

After the macadam has been laid it is a source of great annoyance to have holes pawed in it by standing horses, and the cost of the gutter is little if any more ; the above price not including excavation and grading, which would have to be done to prepare for macadam. When the macadam is thoroughly compacted by travel, this source of annoyance is lessened very much, but not altogether obviated unless by a gutter of cobble stones, flag stones or concrete.

Machinery. The roller used was a five and one-half ton horse roller. We purchased two and one-half tons of pig iron to weight it with. The old jaws of the crusher may be used for that, but they are too heavy to place or replace at convenience.

In setting up the crusher it is a great matter to view the operation from a labor-saving point of view. Let gravity help the men to bring the stone to the crusher and the gang may be reduced to a minimum.

The regular screening attachment to turn out three grades was purchased with the crusher, consisting of an endless chain of buckets raising the stone to the revolving perforated drum, which is set up in a frame to which are attached chutes. We constructed larger chutes to hold a wagon load or more each, and the labor of shovelling up the stone was saved. Great care should be exercised in making everything convenient at first. Our crusher, although built to be convenient for frequent moving, was set up twice ; the distance macadamized was a mile and a half.

It was set up solidly each time and a shed built for the engine. When wagons with stone to be broken came in while the crusher was running, they were unloaded directly on to the platform beside the man or men feeding. Otherwise the stone was wheeled on to the platform from the pile. The amount of money to be spent on labor-saving conveniences must be determined by the circumstances solely.

Since the product of the crusher as to amount varies with the size and hardness of the stone to be crushed, and also with the set of the crushing plates, etc., etc., the results obtained in one locality and under one set of circumstances cannot be offered as a guide for all localities and circumstances.

Turning to one test in 1896—Four loads averaging 2.67 cubic yards each were broken in an average of twelve and one-half minutes each, or at the rate of 12.78 cubic yards per hour. The greater part of the stone brought to the machine was field stone just as it was picked up, from say five inches in diameter to the limit imposed by the opening, viz., 6 x 14 inches. It is true that larger stones were often brought (although we endeavored to get the teamsters to sledge them to size before bringing), and a certain amount of sledging was always in order. One of the loads in the above test was all sledged stone (blue hard-heads, etc.,) measuring 2.85 cubic yards weighing 4.06 tons, broken in fifteen minutes. The weight of a cubic yard as measured in wagon of this stone would be 2,850 lbs., but we might assume in general the weight of the ordinary field stone as picked up to average not far from 2,500 lbs. to the cubic yard.

In 1897 with another engine and not so much of the largest size turned out, a test shows that three loads averaging 2.41 cubic yards and 6,020 lbs., or three tons each, took an average of sixteen minutes to grind. The weight per cubic yard was 2,492 lbs., and cubic contents of a ton 0.80 cubic yard ; rate per hour, 9.19 cubic yards or 11.46 tons. The product of the 7.24 cubic yards was 7.61 cubic yards of three grades measured separately. This latter consisted of 0.59 cubic yards of the first grade or largest size which passed out of the end of the drum ; 4.63 yards of the second grade which passed through the two-inch circular holes in the screen ; and 2.40 cubic yards of "screenings" which passed through the one-inch circular hole.

The product contained very little of the coarsest grade it will be noticed ; while in the first case perhaps half the product passed over the screen.

However, the average per hour including delays of all kinds is much less. I find in 1897 that only six yards were broken per hour paid ; and the cost, including breakages, (of which we had one of some magnitude) and accounts, and delivery on the roadbed, amounted to 43 cents per cubic yard unbroken, or 11½ cents per square yard. Stone cost us 37½ cents per cubic yard delivered at crusher. Deducting the expense of repairing, rebabbiting and all accounts, 34 cents would cover the cost of breaking and delivering per cubic yard on the road.

Concrete Walks. While the crusher was in operation 11,300 square feet of concrete pavements were laid. The screenings from the crusher were used for the concrete. It would have been profitable to use some of the medium grade on a heavier walk. It is much easier to level the bed for the topping when the material composing the concrete is not very rough and so the workmen object to the latter quality.

Extra screens may be attached under the revolving drum referred to under "Machinery," so that the screenings may be passed over a five-eighth inch mesh. That which passes the mesh falls on a fine screen which removes the flour-like dust, and the clean stone and sharp sand passes to the cart to be taken to the mixing board to be used for the "fine" concrete or topping. The rough screenings with only the dust eliminated may be used for the rough concrete.

One of the pavements of a total depth of twelve inches, built on a sub-grade of porous soil, on a business street and turning out to be a thoroughly satisfactory job, cost 9½ cents per square foot.

The foundation consisted of five or six inches of cobble stones topped with two or three inches of gravel to make eight inches in all ; and the concrete consisted of three inches of "rough" and one inch of "fine."

The curb was of concrete six inches by fourteen inches. placed on a bed of small cobble stones and gravel, well tamped, six inches deep by twelve wide. This was considered better than making the concrete curb itself deeper to avoid frost as it made a drain and of course was much cheaper and quite solid. This sidewalk was designed for a business street and was ten feet wide. I am an advocate of three or four foot sidewalks on residential streets in small towns in order to procure the spread of permanent pavements by lessening the cost per lineal foot. The concrete may be lighter the smaller the "boy" or square. In place of laying three foot board sidewalk in out-lying districts I have been advocating the use of broken stone, nicely crowned, say four or five feet in width, but we have laid none as yet. There are a few hundred yards of gravel walk.

(Signed) ARTHUR G. ARDAGH,
Civil Engineer.

CORNWALL.

I do not know of any town in Canada, in which it is so difficult to construct a permanent street, as Cornwall. We have no gravel available, for one thing, and the sub-soil that we have here, is a sort of mixture of soapy clay and quicksand in which any material or metal sinks quickly out of sight.

The Town Council has for years past put tons of costly metal upon our streets, and each spring a small army of men was employed to keep our roads in some sort of shape, and many thousands of dollars have been spent in this way.

Upwards of thirty thousand dollars have been spent on one street alone in the past twenty-five years, and still our roads have always been very bad ; some blocks being almost impassable, for even a moderate load, during the spring months.

This year, however, our Council decided to adopt the views set out in your various Bulletins, and set apart one block for experimental purposes.

The block selected was one having a great deal of heavy traffic over it, and one that we have always had great difficulty in keeping in shape.

The first thing we did, was to put down four inch tile drains on each side of the proposed street. and as the soil was very wet, we put in a number of diagonal drains. These tile drains emptied into a sewer at the end of the block.

After allowing about four weeks to dry the roadbed, we had our engineer lay out a roadway twenty-four feet in width.

The roadbed was then excavated to a grade line, the excavated earth being thrown on each side to form a boulevard. Instead of curb stones, we used what might be described as an ordidary pine plank.

This plank served three purposes. It retained the broken stone in the roadbed proper ; prevented the loose earth from being mixed with the stone, and formed one side of the gutter. These gutters emptied into catch basins placed at the end of the block.

When our roadbed got dry we covered it with a layer of stone, broken to cubes of about two inches in size, to a depth of eight inches in the centre, running to six inches at the sides.

This as it was being put down we rolled thoroughly with a fifteen ton steam roller which the town of Brockville kindly allowed us the use of.

When this foundation was thoroughly compacted, we placed another layer of slightly smaller stone, four inches in the centre running to three inches at the sides, and also rolled this thoroughly, until the roller would make no impression.

Over this we sprinkled common field sand, and then turned our street sprinkler on, following up with the roller again. The water washed the sand into the interstice of the stones, and this packed by the roller, formed an exceptionally good bond. The street was kept closed two days longer to permit of its drying.

It now resists the wear and tear of traffic admirably and sheds water like the roof of a house. All our people are satisfied with the experiment, and are demanding that we continue this improvement.

I might add, that we get our broken stone from our County Council ; it is broken by the prisoners in our county jail ; we can get it in any size we wish, and at a very reasonable price.

There is a very strong feeling in our town that our Council for next year should buy a steam roller, and I am inclined to think the purchase will be made.

General regret is expressed that this system of making roads was not adopted years ago.

JOHN A. CHISHOLM,
Member of Board of Works.

STRATFORD.

The question of road-making has received considerable attention in the city of Stratford during the last year, and if the policy adopted by the present council is carried out in the future, it will result in decreased expenditure, through a saving in the cost of maintenance, and a vast improvement in the roads.

The expenditure in the past has been for the most part for maintenance, and very little permanent work has been done. The soil is clay and the gravel obtainable contains more or less clay, the roads are therefore uniformly bad in wet weather and require a coating of gravel each year to keep them from breaking up.

The money appropriated for street work, about $12,000 per year, has been used up in patchwork and no improvement was possible so long as the ordinary system of expenditure by wards was followed.

It was recognized by the council of 1897 that no improvement or saving in expense could be made without a radical change both in policy and methods of doing work. Road-making machinery was therefore purchased. the money being taken from the appropriation for the year, and an engineer was appointed to advise the council and to take charge of the work and expenditure of the money.

The road-making machinery now in possession of the city consists of a fifteen ton road roller, a rock crusher with elevator and screens capable of crushing about ninety yards of field stones per day, and a reversible road grader.

The streets were graded, drained and macadamized during the latter half of the year 1897, and several heavily gravelled roads were broken up, regraded and rolled at a small cost.

It is found that much good work can be done on heavily gravelled roads by this method provided that the metal on the road is not too fine and that the grading is thoroughly done. Roads with a small depth of gravel or with worn out gravel cannot be much improved without the addition of a considerable quantity of new metal.

The council has decided that no permanent roads will be built until such time as all drains, sewers, water and gas pipes are put in, and all sewers that are now being put in have house drains put in at the same time. This work makes a grid of trenches on the streets ; but when once completed the roads will not require to be broken up again and the cost of maintenance of roads will be very small.

W. F. VAN BUSKIRK,
City Engineer.

INGERSOLL.

In response to a request in December last for information relating to the streets of Ingersoll, W. H. Jones, at that time mayor, writes :

You will remember we invited you up a couple of years ago to exchange views with you regarding certain improvements we were contemplating in our roadways, and our council was so impressed with the importance of the ideas you suggested that they determined to at once purchase the necessary machinery and make a start toward the permanent work you had advocated. We bought a street roller, plow and stone crusher and elevator, and in order to educate our citizens as to the advantages of having good roads, we decided to take a block about fifty feet long by thirty feet wide on one main street, and build it according to your plans as submitted to us. We excavated the road bed for a depth of twelve inches and thoroughly rolled the surface until it was perfectly solid ; we then put on five inches of broken stone and thoroughly rolled that course ; then we put on another course of broken stone slightly smaller than the first course ; and after thoroughly wetting and soaking it, rolled as before until the whole became compact. For our top course we put on a course of about a couple of inches of stone chips and dust, thoroughly wetting and rolling until the whole mass became as solid as cement, and making, as you are aware, one of the finest pieces of road that could be built. I may mention that before this was done this piece of road had given us very great trouble in the spring and fall, on account of it being so wet, and at times it was almost impassable for heavy loads, although for years we had been continually putting on gravel through the summer, and scraping it off as mud in the spring. I also wish to mention that after making one excavation we put down twelve-inch tile drains on each side of the road with catch-basins to take off the surface water, and the consequence has been that our citizens were so well pleased with the smoothness and durability of the road after a winter's traffic had passed over it, that when the spring came and they saw that there was not the slightest rut or damage done to it, they decided to at once go on and build the balance of our two main streets in like manner. A by-law was submitted to the people for $10,000 ; it carried, and we have now nearly completed the work and I have not the slightest doubt that when finished we shall have two as good roads as there are in the country. This has been done under the general rates, on account of the two roads being leading thoroughfares, but in the future we may alter this and have our side streets done on the frontage tax plan. One thing however is certain, we are so well satisfied with our experiment that we shall never go back to the old plan of hauling dirt and gravel on our streets.

You will also remember complimenting us on the appearance of our sidewalks in comparison to the state of our roads as they then were. For the last seven or eight years we have entirely discarded the use of laying down wooden sidewalks. A by-law was passed that all sidewalks should be laid on the frontage tax plan, and giving the citizens the power to petition the town council to lay down artificial stone walks instead of the plank walks. This has been availed of to such an extent that we have now over twelve miles of silica-barytic stone sidewalks laid down. and we are adding to it year by year. We have done it on the plan of the town assuming the cost of all crossings and intersections, and in the case of corner lots, the town pays the cost of one-half of the depth of the lot, the property owner paying the rest. This has been done on the principle of twenty year payments divided equally, so that the burden should not come too heavy. So that as you are aware, we are not only adding to the appearance of the town, but I am sure that the durability and the permanent character of the work will result in a large saving in the years to come.

Brockville.

Brockville has twenty-five miles of streets, 10.65 of which have received a coating of broken stone, hard limestone and granite being plentiful. The work on the streets is performed by day labour under the immediate supervision of an engineer and a street inspector, and directed by a Board of Works. In 1896, $5,974 was spent on roadwork ; $3,410 on sidewalks ; and $50 on bridges. Respecting the street work, the Mayor, Mr. D. W. Downey, says : —

A portion of our Main Street extending over 2,000 feet was a good deal cut up by the making of numerous water, gas and sewer connections previous to the laying of permanent sidewalks and during next summer we contemplate putting in a better class of roadway on this street, than any we have had hitherto, and hope to profit from the admirable address you delivered here on the subject of "Good Roads".

A very great improvement has taken place in our streets since we obtained the use of a grader, steam road roller and other implements, and considering the great saving of labor thereby, I am often greatly surprised that our adjoining townships have not availed themselves of their use.

As you are aware we only commenced putting down permanent sidewalks during the past summer. These extend to 3,150 lineal feet, covering in all 30,750 superficial feet, at a cost of $6,200.

Niagara Falls.

The Council did not set apart any but a very small sum for actual street improvement during the year, on account of the construction of the sewers which have been under way ; however, they purchased valuable road machinery, including a fifteen ton steam roller and a new grader, and have now in contemplation the purchase of a rock-crusher.

There have been, however, several streets, on which sewers were built last year, which have been macadamized and improved during the past year. The length of street thus improved would not exceed half a mile, but the work which has been done on these has been entirely satisfactory.

We expect next season to go extensively into macadam pavements, and probably some brick on business streets. There are arrangements being made at the present time to provide for the construction of cement or brick walks on an extensive scale, but nothing definate can yet be said in this regard. We have laid none during the past year.

We have obtained a large amount of rock from the sewer construction which is fairly suitable for road metal, though a little soft. This we will have broken during the winter by hand, to give our town people employment.

Whatever work we have had done by our road machinery, has given entire satisfaction and the only thing which now remains to obtain good roads here, is attention to the work by an energetic committee, and the employment of a first-class foreman who understands road construction in its details.

(Signed) CHARLES H. MITCHELL,
Civil & Hydraulic Engineer.

LONDON.

The following extracts from the annual report of the Street Commissioner of London, Ontario, Robt. Ironside, to A. O. Graydon, City Engineer, contain information of an instructive nature :—

Sidewalks. I would recommend that the specifications for walks be amended so as not to allow any planks of a less width than eight inches to be used as it has been found that the lesser widths contain sap and are therefore not fit for sidewalk purposes.

I would also recommend the appointment of an inspector for this work as it is impossible at present to make a close inspection of the material as it is brought on the work, and should a contractor so desire, it is an easy matter for him to substitute inferior scantling between the visits of the Street Commissioner and the Engineer. The presence of an inspector would be a safeguard against this and other devices contractors are prone to practice in the carrying out of City contracts. The contractors for this work for this year have given general satisfaction and there is little or no complaint about their work or material used, but considering everything, I think an inspector necessary.

As in the past the repair of walks is one of the principal expenditures of this department and while careful supervision has been exercised and repairs made when necessary, yet there are several sidewalks throughout the city that are in a positively dangerous condition and almost beyond repair. In the repairs to sidewalks this year we have used 115,000 feet B. M. of lumber and 8,000 pounds of nails. This includes the material used in relaying old plank saved from old walks that were taken up and replaced with a new walk and relaid in stretches where there were no sidewalks. About 1,200 feet of this class of walk was laid. From the foregoing it will be seen that the "*Plank Sidewalks*" are by no means of a permanent nature and the constant adding each year to our already large mileage of plank sidewalk, together with the annexation of London West, means added increase of expenditure for this work each year ; and with a view of keeping down this expenditure, and at the same time putting our sidewalks in an up-to-date condition I would recommend that permanent walks only shall be laid on our principal streets and avenues.

Pavements. The superiority of broken stone roadways over the ordinary gravel roadways is apparent and more of this work should be done each year. There would then be no necessity for scraping off in the spring, the material that was placed there the year previous. I would therefore recommend that less gravel and more broken stone be used in the future, throughout the city ; then good roads, not mud roads, would be the rule and not the exception.

The cedar block pavements are, as a rule, in poor condition, some are even beyond repair, and nothing can be done except replacing them by another and better class of pavement.

The asphalt pavement is in fairly good condition, and with the exception of that portion along the street railway tracks, seems to be wearing well. The great objection to this pavement is its slippery condition at times. The cause of this is the too frequent use of the watering cart. Washing down should be substituted as is done in other cities. Washing down thoroughly cleanses the pavement, while on the other hand the moisture of water from the watering cart and the dirt on the pavement renders it dangerous to both drivers and wheelmen, and at the same time destroys the life of the pavement.

A constant source of repairs has been caused by the delivery of material to new buildings and the removal of debris from their site. The teamsters engaged in this work drive over our sidewalks regardless of consequences. The ward foremen have received instructions to make crossings for them but as a general rule the damage is done before their arrival on the scene. I would therefore recommend that a deposit be collected from all who obtain building permits and the amount of damage deducted therefrom.

Culverts and Sewer Repairs. The culverts throughout the city have received the necessary care and attention called for, and every effort has been made to keep them in repair and in a state of cleanliness. The use of the tile pipe in replacing the old wooden culverts is gradually doing away with one of the greatest sources of annoyance and worry to this department. There are several of the present wood culverts and bridges that demand an almost constant supervision, and these should be replaced with structures of a permanent nature without further delay.

Stone Crusher. This machine has, with but few delays, been in operation since May 26th up to December 1st. During that time it has crushed nearly 1,350 cords of stone. The actual crushing time was 110 days, nine hours each, about twelve cords per day.

The cost of the stone, the crushing expenses and the delivery upon the streets, including repairs to crusher, rent of engine, fuel, etc., was about $5.60 per cord.

This is about $1.15 per cord cheaper than we can purchase it already broken from the quarries. The crusher has been removed to the storage yard and is now under cover. I would recommend that this machine be overhauled as soon as possible and some of the old parts that are worn out, replaced with new ones so that it will be ready to start operations as soon as possible.

Gas and Water Trenches. There has been little or no improvement in the manner in which gas and water trenches are left by the employees of those departments or companies. No care whatever is taken to preserve the road metal so that it can be replaced again on the surface, but with the utmost carelessness and indifference it was thrown into the trench in any manner, and at times they have been left in a most dangerous condition. Effective means should be taken to stop this practice. There should be no difficulty whatever in refilling in a proper manner such shallow trenches as these, leaving the roadways in as good a condition as formerly.

Sweeping Block Pavements. These pavements have been swept as regularly as the funds would permit, but owing to the unevenness of the surface they are never in a state of cleanliness. The crevices, even after the most thorough sweeping, retain the horse droppings and other filth, and on a warm day, especially after watering carts go over them, the stench arising from them is, to say the least, simply awful. The health of the city requires that steps be taken to replace these pavements, especially in the heart of the city, with ashphalt or brick. They are beyond repair, and it is practically impossible to keep them clean.

Street Watering. In concluding this report, I would again call your attention to the manner in which the street watering through the city has been done. Good roads have been built, well rolled with the steam-roller and left hard and smooth, and in a first-class condition. In a short time, owing to the excessive quantity of water put upon them by the contractors for street watering, they have become soft and are easily cut up into ruts.

Unless a change is made in the mode of street watering, money is only thrown away in improving the roads. The street watering inspectors either cannot or will not make the contractors do the work as it should be done, and personally I have repeatedly stopped the drivers of the water-carts from watering mud puddles. If this work was placed under the control of this department and a good foreman and teams employed, I have no hesitation in saying that little or no complaints would be made and the street watering would then be done in such a manner that no injury would be done the roadways, and at the same time satisfy the ratepayers who pay for the work.

ST. CATHARINES.

About $6,000 is appropriated yearly for repairs, street cleaning, repairs to sidewalks and some small pieces of permanent improvement, under the control of Board of Works and street superintendent.

A street commissioner is employed during the whole year at a salary of $650. We have this year purchased a grading machine and also a steam road roller and hope to have a stone crusher early next year so that we will be able to follow out Mr. Campbell's instructions.

We have laid this fall about three miles and a half of concrete walk under the local improvement plan which we hope to continue another year.

KINGSTON.

The frontage tax system has been adopted on sewers, and on granolithic and asphalt sidewalks; for sewers in 1885, for walks in 1893.

The City Council Committee, called the Board of Works, has control of all streets and the City Engineer has full oversight. The City Engineer is employed at a salary of $1500.

The streets are in fairly good order but for the last two or three years the appropriation has been too small and the streets are beginning to run down. We used to get $25,000 but only get $10,000 or $12,000 now and the most of this goes in street cleaning, etc. We were getting up fine macadam streets till the reduction. We have about two and one half miles of granolithic walks, one mile of asphalt and the balance plank. Our chief trouble with our streets is the frequent digging of trenches for sewers, water and gas pipes, and we never can keep a street in proper shape.

NORWICH.

During spring and fall the condition of the streets is bad. Only two main streets are gravelled, and as they lead to railway stations as well as being main roads from the country, the heavy teaming over them cuts them badly. Other streets are only earth roads, graded. About five years ago nearly $1,000 were spent for gravelling these main streets, and patching has been done since. Most of expenditure for streets has been for sidewalks recently.

Although our rules of council require committees to report in writing stating work completed, location and cost of same before expense is incurred, they do not adhere to that rule. So that because of this lack of system the figures given are approximate, but are probably sufficiently correct to answer your purpose.

Our gravel costs fifty cents per cord, and $2.50 for drawing and laying—and not very good at that. For the past three or four years we have used a good deal of brick-bats, which we get from the brick yards within two miles of the village. They make a good road and appear to wear well. The past summer about a quarter of a mile of Main street was coated with these and covered with gravel. The bats are, of course, broken with a hammer to about two inches in size.

STAYNER.

The way the work is done by the Commissioner and the manner of paying accounts is such that I cannot give definite answers.

CLINTON.

The general condition of the streets is not good, but since the purchase of the road machine a number of the streets have been graded and made narrower.

COBOURG.

Streets are in better condition than they have been in for some years, some of the gravel roads have been broken up and regraded and are very fine.

AILSA CRAIG.

The streets were put in excellent permanent repair fifteen to twenty years ago and have only needed patching since that time, with an occasional coat of gravel on the heavily travelled streets.

WINGHAM.

A greater effort has been made this year to improve the streets than formerly. Three miles of Portland cement or granolithic sidewalks are now built. We expect to build a large quantity next year. Had we a stone crusher along with our road machine we would have good streets.

LONDON.

We are using stone and cedar curb and narrowing up streets, and putting down macadam roads as much as possible. using broken stone, underdraining them and rolling with steam roller 12½ (long) tons empty. Plank, asphalt, granolithic and stone are used in the construction of sidewalks.

PICTON.

Money is taken from the general funds of the corporation and expended on roads, walks, bridges and culverts where required "or where the indicator denotes the biggest pull."

We require the appointment of a qualified practical man independent of the bias of the wire pulling always in vogue in councils, to superintend the work on streets, walks, bridges. Such a system would be far better for this, and, I believe, for every municipality; and would be a benefit from a monetary standpoint.

LINDSAY.

Some streets in fair condition, others bad. It is the intention of the council to improve streets in accordance with your ideas.

WATFORD.

Fairly good improvement is being made in the streets. The only special effort was two years ago when we bought forty car loads of gravel from the G. T. R. Co. and had it taken from Komoka gravel pit.

We need more uniformity in our streets, some of the councillors grade too high and narrow and we need a good instructor.

SAULT STE. MARIE.

Streets are not in good condition. None of them that do not cut up in wet weather, though of course their condition is improving every year. It is not the result of any good system though. The worst portions are improved each year, but no systematic attempt.

LAKEFIELD.

About three miles of grading was done in 1896-97, and broken stone was used, the average depth of stone being fifteen to eighteen inches. About 800 yards of stone was also used to fill up a wharf owned by corporation and to grade it uniformly with adjacent street; part was done in December, 1896, the balance in January, 1897.

The roads are first-class; nearly five miles have been covered with stone from the Trent Valley canal during the past two years. Stone or tile culverts has replaced wooden ones, streets graded to uniform level and water tables cleaned and improved. About $1,000 has been spent in 1897 on roads. Stone was delivered to us free by canal contractor and was broken by contract about six inches deep at 1½ cents per square yard.

Our Road Master is employed by the year and has other duties to attend to for which he receives $350 per annum.

TILSONBURG.

Steps are being taken to improve the principal street called Broadway street, and the Provincial Instructor's assistance and advice will be asked by the council.

FORT ERIE.

Plank has always been used for sidewalks until this season when granolithic was adopted and about 400 yards laid down. If satisfactory it will be adopted entirely for the future.

EXTRACTS FROM TOWNSHIP REPORTS.

MACHINERY MAY BE PURCHASED.

Adjala, Simcoe Co.—Special effort has been made recently in that gravelling has been started and the purchasing of road machines is under consideration. I believe that if the money could be judiciously expended, and thirty or forty cents a day charged, we would have better roads than under the present system of statute labor.

TILE CULVERTS SATISFACTORY.

Adelaide, Middlesex Co.—Our leading roads are gravelled and are as good as you will find. Culverts are mostly of tile, which give good satisfaction. The tile are manufactured in the municipality.

WOULD LIKE TO COMMUTE.

Ancaster, Wentworth Co.—The council would like to be in a position to commute a part or the whole of the statute labor as deemed advisable.

DOING BETTER WORK.

Arthur, Wellington Co.—The general condition of the roads is fairly good. The county road is good. The most of the roads in the township are fairly well graded and a great deal of gravel is being put on every year by statute labor. The people are getting interested in the matter and are doing better work. It costs the township close on $300 each year for gravel. They pay six cents per load for statute labor work and ten cents per yard for contract work. This is for gravel alone. Hauling is extra.

BECOMING INTERESTED.

Ameliasburgh, Prince Edward Co.—The roads are in a very good condition ; gravel beds are plentiful in many parts of the township and the inhabitants are becoming interested in the roads and bridges of the municipality.

The doing away with the present system of statute labor and replacing it with a tax on the ratable property of the township, the money to be applied under the supervision of the best available overseer, would be more in the right direction, but public opinion moves slowly, sometimes.

NO SYSTEM.

Albemarle, Bruce Co.—Our roads are very bad ; we have not two miles in the whole township that could be classed as really good. Our roads are constructed without any regard to plan or system, and in consequence the improvement will be slow.

IT WOULD PAY.

Amabel, Bruce Co.—Statute labor as it is worked in our municipality is a complete farce. If the municipal council would only levy twenty-five cents per day (even 25 cents) and appoint a Road Commissioner, it would pay every time.

A STONE CRUSHER.

Bertie, Welland Co.—The road machine is constantly in use during he road-making season. The general condition of the roads is not good. Efforts are now being made to secure a stone crusher.

IN DEBT FOR RAILWAYS $7,000

Bexley, Victoria Co.—The general condition is not to say bad. Pathmasters draw out every summer gravel where it can be got handy, or do some grading with plows. However, this time of year (fall) the roads appear as bad as though there were no work put on them in the summer. If stone could be utilized, there is any quantity of lime stones close along the roads. I have never seen any of them drawn on the travelled roads and broken up. It is always gravel, or turnpike with the plow. The hammers we got for breaking the tops off the stones striking up too high. The township is $7,000 in debt to railways and cannot spare much money to lay out on roads. This year (1897) hardly anything has been laid out.

DO NOT GRADE MORE THAN CAN BE GRAVELLED.

Blenheim, Oxford Co.—The grader has been pretty steadily at work in 1896 and 1897. We do not care to grade, however, more than we can gravel, as graded roads become very bad roads in time of rain. The roads are fairly good. The outlay on bridges each year is very heavy. We have two large streams winding through our township causing us to keep up over fifty bridges of large size, besides many small bridges.

SHUT OUT FROM MARKET.

Binbrook, Wentworth Co.—We feel very much the need of a good road metal. The road leading through the township is so bad that we are practically shut out from market with heavy loads. The difficulty of procuring stone makes it almost impossible to better ourselves.

MORE SUBSTANTIAL WORK.

Brudenell, Renfrew Co.—Roads are rough and in a poor condition generally all over the municipality. We have no means to improve them except the statute labor and some small grants by council to repair places that sometimes become dangerous to public travel, and sometimes a colonization grant, but these grants are becoming fewer ever year. The main reliance is statute labor, and this, in a great many cases, does not amount to much, and sometimes is done with a great lack of judgment. In my opinion it would be far better to levy a commutation tax at about fifty cents per day and do away with statute labor. There would be more substantial work done.

A ROCK CRUSHER NEEDED.

Burleigh and Anstruther, Peterborough Co.—The statute labor system is bad, but the settlers are too poor to remedy the evil at present. If more broken stone was used it would be better. This country here requires a rock crusher which could be utilized along the main roads on the spot.

THE ROADS WOULD BE BETTER.

Barton, Wentworth Co.—It is the opinion here that roads would be better kept if statute labor by commutation or otherwise were abolished and roads kept in order out of the general funds of the municipality. All stone roads belong to road companies. There is plenty of stone in this township and of good quality.

AN EFFORT TO IMPROVE.

Beckwith, Lanark Co.—Some of the roads are very good and some are very bad, but an effort is being made to improve them by grading and stoning with stone from hammers and stone crushers.

CONSIDERABLE AGITATION.

Brant, Bruce Co.—There has been no special effort to improve the roads other than by county grants which had to be supplemented by an equal amount by the township this year (1897.) Considerable discussson and agitation pro. and con. has taken place regarding better roads. We considered it advisable to place literature on the subject of road-making in the hands of the pathmasters soon after their appointment. This should be done early, say April.

THE TOWNSHIP MAY BUY.

Brighton, Northumberland Co.—The township has not ventured as yet to buy road grading machinery, but it is possible they may do so before long, if from machine work in neighboring township they are thought to be a saving in labor and a better mode of making and repairing roads. Then the township may buy. It is hard to apply statute labor on machines, and the time to force commutation and hire all road work has hardly yet come in this community, although some think this would be a gain.

TALK THE MATTER UP.

Chapman, Parry Sound District.—The roads are in a very bad condition, especially during the months of April, October and November. There are millions of tons of rock (granite and feldspar) in this and adjacent townships. If we had some good man to talk the matter up, the ratepayers who are afraid of higher taxation might demand the purchase of a rock crusher by the Council

THE RATEPAYERS ADMIT IT.

Charlotteville, Norfolk Co.—The roads are passably good and improving slowly all the time. Most of the roads in this township are sandy roads and very heavy in summer, some parts have been clayed and keep in pretty fair condition. In the vicinity of the gravel beds the roads are improving, but gravel being so scarce very few pathmasters can make use of it. The old way of performing statute labor I consider a fraud, the system is *passe*, much of the labor is wasted under the present system—the ratepayers admit it.

FOR FORTY CENTS A DAY.

Chinguacousy, Peel Co.—The general condition of the roads is first class in dry weather, but bad in spring. Statute labor is a fraud, more work and better roads could be made for forty cents a day.

THIS LAST TWO YEARS.

Carnarvon, Manitoulin District.—The roads are good in dry weather being dirt roads. They cut up in the fall. Our roads are getting better since we have been using the machine this last two years.

SNOW DRIFTS.

Charlottenburg, Glengarry Co.—For some years a good deal has been done to substitute wire fences for timber fences on north and south roads and other roads subject to snow drifts. The effect has been very good not only for winter travel, but also in making a dryer and firmer road in spring and early summer.

IT IS THE NARROW TIRE.

Culross, Bruce Co.—We have pretty fair roads in dry weather. In spring and fall they sometimes get very bad, especially when freezing and thawing. There has been a little more than usual spent on the gravel roads by the county this year. I think that if we could get the wide tire and the unequal axle introduced it would do more to improve our roads than anything we have had yet, or rather save them from destruction, for it is the narrow tire that cuts them up in soft weather.

ONE DRAWBACK.

Colchester North, Essex Co.—There is one great drawback we labor under—that is the failure to get the statute labor performed early in the season so that grading and gravelling has time to settle before our autumn rains.

BY NOT GETTING THE WATER OFF.

Calvin, Nipissing District.—The roads are rutty with steep grades. The pathmasters put in most of their time trying to ditch and crown the roads. Some succeed, more make them worse, if anything, by not getting the water off, still all do the best they know how with what time they have. Twenty miles of these roads have been made by grants from the Government, the Mattawa and Caladar and Shield Pit roads, but there is hardly sufficient statute labor to keep them in repair. Where the ditches carry off the water the roads are passable, (a piece of good and a piece of bad road sandwiched.)

SUPPLEMENTARY LABOR.

Caradoc, Middlesex Co.—The roads are very good. The Council, for the improvement of roads, has adopted the system of supplementary labor, viz., where a road division puts on a certain amount of gravel over and above statute labor, the council supplements the amount. Some are in favor of doing away with statute labor and having the money raised by commutation, say at fifty cents, expended by a road commissioner, while others oppose anything like increased taxation.

A PUBLIC HOLIDAY.

Christie, Parry Sound District.—There is so much rock and swamp in this district that it is and always will be impossible to make good roads, but they can be vastly improved. One of the first steps would be to abolish statute labor which is simply a public holiday.

WATER FOLLOWS THE WHEEL TRACKS.

Cardiff, Haliburton Co.—The roads are in a fearfully bad state all over the township. Water follows the wheel tracks washes out the dirt leaving the stones and boulders for wheels to climb.

IT IS THE PREVAILING OPINION.

Clarke, Durham Co.—The roads are generally good. There is a general improvement made during June and that has to do, unless some part is washed away by floods, and pathmasters have to see that they are repaired. It is the prevailing opinion that the roads are not in as good a condition as they should be considering the amount of statute labor expended or employed thereon and money spent.

EFFORTS HAVE BEEN MADE.

Clarence, Russell Co.—Roads are in a pretty fair state and efforts have been made to improve them still more. We had our road machine rather late last summer and it is expected that more improvements to roads will be made next year.

THE OLD SYSTEM.

Cornwall, Tp., Stormont Co.—The roads are not good, nothing outside of the old system of statute labor is employed.

DISCUSSING ABOLITION.

Derby, Grey Co.—The Council are contemplating the purchasing of improved, up-to-date machinery and are also discussing the abolition of statute labor.

A GREAT IMPROVEMENT.

Dunn, Haldimand Co.—The roads are pretty good. The road grader makes a great improvement on our roads.

SOME LEADING ROADS.

Dummer, Peterboro' Co.—The general condition of the roads is fair, some of the leading roads extra good. Five road divisions are kept up by $500 road appropriation besides about nearly 700 days statute labor yearly.

THEY SHOULD BE ELECTED.

Dorchester, North, Middlesex Co.—The roads are not very good. There has been $1,000 expended for gravel on roads that had none on before. The Council of 1897 if elected for 1898, I think, would favor buying a grader.

MORE REAL WORK.

Dumfries, North, Waterloo Co.—It is likely a road machine will be purchased this season and then more real work will be done on the roads.

ABOUT THREE THOUSAND DOLLARS.

Dereham, Oxford Co.—No special effort has been made to improve the roads this year. About $3,000 per annum is usually expended for the improvement of roads.

BY CONTRACTS.

Downie, Perth Co.—The roads, especially the leading ones, are fairly good, being kept up by township grants and gravel put on by contracts. The other roads are repaired and gravelled by statute labor, while some road beats, which have far to haul, get grants from the Council. We have a large quantity of gravel, some road beats being close to pits, thus the roads can be kept and even made by statue labor ; other beats have as far, in some cases, as five miles to draw gravel. What we want in this township, in my opinion, is a stone crusher, but as yet the Council does not see their way clear to buy one.

THE RAILWAY BONUS.

Eldon, Victoria Co.—This township is burdened with a debenture debt incurred in bonusing a railway and until that debt is paid off our Council, fairly representing the feeling of the ratepayers, are averse to expending much money on roads, more than is absolutely necessary to keep them in safe condition.

SHOULD BE COUNCILLORS ONLY

Eramosa, Wellington Co.—No special effort and with yearly statute labor, and usual annual grants, the roads seem to be running down. There seems a general willingness to start out afresh, purchase road machinery, appoint competent road commissioners, etc.

I feel satisfied it would facilitate improvement if Councillors were either debarred from acting as road commissioners, or else only legally acting, when appointed by by-law, the same as any other officer. I think the law is defective ; the Council as Councillors only should be elected by popular vote.

PROPER VALUE FOR THE EXPENDITURE.

Easthope North, Perth Co.—The general condition of the roads is "fair to middling," a great deal better than they were fifteen years ago, but not so good as they should be. There is no system of road-making, and consequently there are many different "styles and shapes" of roads. Every pathmaster will have his own way. No special effort made but there is gradual improvement. The whole system of statute labor should be abolished and then, and not till then, will roads assume their proper shape and condition and proper value be gotten for the expenditure made thereon.

GRADING AND GRAVELLING.

Easthope South, Perth Co.—This year (1897) the road grader was used over all the township roads, rounding off the road surface, grading lower parts higher, and the newly graded parts were gravelled.

A QUALIFIED PERSON.

Egremont, Grey Co.—In some localities the roads are fair, according to the skill of the pathmaster ; in others they are simply horrible. No special effort has been made to improve them, and I can see that legislation on this subject is imperatively necessary. I am fully satisfied that if we paid 40 cents a day and had this money expended by a qualified person we would soon have superior roads. I think the general feeling is that way and our present system is now considered a relic of bygone days.

HEAVY LOADS, NARROW TIRES.

Fredericksburgh South, Lennox Co.—The cheese factories open early before the roads become dry ; with heavy loads and narrow tires the roads are badly damaged.

IT SHOULD BE SUFFICIENT.

Glenelg, Grey Co.—The statute labor should be quite sufficient to put the roads in good shape, but many of the pathmasters are very careless in the performance of their duties, and think if they put in their time that is all that is necessary.

A GREATER INTEREST.

Gwillimbury East, York Co.—A greater interest is being taken which will doubtless lead to more systematic action.

THE MACHINE KEPT AT WORK.

Gwillimbury West, Simcoe Co.—The purchase of a road machine at a cost of $250 was a special effort in 1897. The machine was kept constantly at work for two months.

OUT-OF-DATE.

Goulbourne, Carleton Co.—Every corporation should have two or more road graders, and if the out-of-date statute labor system was done away with and the road graders substituted the change for the better would soon be realized.

AWFUL IN SPRING.

Gosfield North, Essex Co.—There are about ten miles of natural gravel ridge, one of the best roads in the Province. About twenty more are gravelled and in good condition ; the balance are clay roads, fair in continued dry weather, but awful in spring and during a wet fall.

NEED A ROAD TO MARKET.

Gower North, Carleton Co.—Our leading roads some years ago were gravelled, but they have sunk down and become too flat. Since we got our grader we are covering up the old gravel and starting in places to gravel again the next year after grading them. If I might be permitted I would just like to suggest the propriety of the Government amending the Municipal Act in such a way as to make townships lying next to a city give something of a decent road through their territory to the city or market. We are living about twenty-three miles from the City of Ottawa, and I might safely say that about six or seven miles of that road through the Township of Nepean is simply impassable in spring and fall. A very large part of it is in a natural state.

OTHERS DO NOT CARE.

Glanford, Wentworth Co.—Some pathmasters try to keep the road in good condition ; others do not seem to care. I believe the proportion of careless ones is on the increase or has been in recent years.

VERY LITTLE EXPENDED.

Georgina, York Co.—This township has for twenty years (1875 to 1895) been paying a very heavy tax, the result of which was that very little was expended on the highways.

FOR COMMUTATION.

Garafraxa East, Dufferin Co.—The council is going to submit a by-law to the vote of the electors for the commutation of statute labor.

VERY PRIMITIVE.

Glamorgan, Haliburton Co.—Statute labor is nearly all we have to depend on to keep the roads even passable, and the majority of pathmasters' ideas as to roads and the repairing of them are very primitive.

VERY OFTEN DANGEROUS.

Grattan, Renfrew Co.—The greater part of the roads are rough and in the spring and fall they get cut up so that public travel is much impeded and very often dangerous. All that can be done is barely to keep the roads in a sort of repair.

ONE ACRE OF GRAVEL.

Gosfield South, Essex Co.—We have a gravel ridge about one mile long and about sixty rods wide and fifty feet deep of excellent quality. We purchased one acre some fifteen or twenty years ago at a cost of $300, and we are using it yet.

IN GOOD ROUNDED SHAPE.

Grantham, Lincoln Co.—The roads are nearly all gone over every season with the road machine or large scraper; and I consider the clay roads in good rounded shape.

THE BULLETINS HAD A GOOD EFFECT.

Harvey, Peterboro' Co.—Condition much improved the last two years. The colonization grants from the Government have helped these roads very much for several years past. The little Bulletins which were sent me for distribution in 1896, and which I enclosed in pathmasters' lists, seem to have had a good effect wherever they have been intelligently used by the pathmaster. I would suggest that you cause about fifty copies of the same to be sent for the pathmasters for 1898. It is noticed that the grading, pitch in centre and the width of turnpikes or roadbed is much improved.

STONE CRUSHERS WANTED.

Howland, Manitoulin District.—The council think the Government should give us stone crushers and withhold Government grants to the roads, as stones are plentiful and gravel scarce, and it is the only way to make permanent roads (crushed stone).

WHEN THEY LEARN HOW.

Hallowell, Prince Edward Co.—Our roads in this township are going back and are not so good as they were years ago, but I believe as we learn to use the road machine the roads will improve. Last year we almost spoiled every piece of road we fixed with the machine but this year we have very much improved them. I think we are going to like the machine when we learn how and when to use it, but last fall the people cussed it.

THE PLAN WORKED ADMIRABLY.

Hilton, Algoma District.—The general condition of the roads in this township is good. The municipal council this year handled all commutation moneys and gave out jobs on the different road divisions and inspected the work when completed and found this plan to work admirably The work was done according to specification and a very much larger amount was done for the same amount of money. Heretofore the pathmasters superintended the laying out of the commutation moneys with very poor results.

RENT THEIR MACHINES.

Hibbert, Perth Co.—The council are employing road scrapers and machines from outside parties to do road work. A considerable amount of road grading was done this year.

ONE MILL ON THE DOLLAR.

Hullett, Huron Co.—One mill on the dollar as a commutation tax payable when other taxes are paid would give us in Hullett about $2,000 which sum could be expended on the roads in a much more profitable manner than under the present system.

SHOULD BE SCREENED.

Hay, Huron Co.—Under fair conditions the roads are usually good, but during extremely wet weather they get soft and muddy owing to the sandy nature of our gravel.

THEY IMPROVE LEADING ROADS.

Huron, Bruce Co.—A road machine was used this year for about ten days in grading gravel roads. On an average $1,000 per annum is expended by the township council in improving the two leading gravel roads in the township, viz.: The Saugeen and Sideline Fifteen.

SHOULD BE ABOLISHED.

Hamilton, Northumberland Co.—The roads are not what they should be, but they are as good as can be expected under statute labor which should be abolished.

LABOR WASTED.

Johnson and Tarbutt, Algoma District.—Mud roads, labor wasted for want of road machinery, the council afraid of a little extra tax.

SHOULD BUY A CRUSHER.

Keppel, Grey Co.—We have limestone suitable for crushing all over the township and scarcely any road is over a mile from some. There are also granite boulders scattered over a large part. There is talk of buying a stone crusher.

THE RIGHT WAY.

Kincardine, Bruce Co.—The roads are in a fairly good condition. The grader has been used in rounding up the gravel roads by gathering the gravel in the centre and cutting off the sides and putting it in the opposite direction. The roads are made a good deal narrower than formerly, especially on hills, in order to prevent water from running down the centre of the road.

FOR SOMEONE ELSE.

Lochiel, Glengarry Co.—I would say if our council would assess the ratepayers fifty cents per day or less for statute labor and expend that on the roads, the improvement in the roads would be seen in a very short time, as most of those who perform statute labor think they are working for someone else and not for themselves.

STARTED IN THE RIGHT DIRECTION.

Front of Leeds and Lansdowne, Leeds Co.—The roads are bad. Since the road grader was purchased a very decided interest in making good roads has been awakened throughout the township. Your literature this spring was very helpful in getting road-making started in the right direction. The small pamphlets issued by you in time to be sent out with the road lists are much appreciated. The council are contemplating the purchasing of a stone crusher and road roller but are not fully decided as to the crusher thinking they may be broken by hand at a less rate.

LOANED BY THE COUNTY.

Luther East, Dufferin Co.—The township got the loan of a road machine from the county and have been doing a considerable amount of grading with it.

THEY WERE TOO HARD.

Loughboro', Frontenac Co.—In the name of common sense how does the department expect a clerk to be in a position to answer all these questions? It's absurd.

LEVY ON THE ACREAGE.

McGillivray, Middlesex Co.—Would suggest that the Legislature enact that any municipality may levy statute labor on acreage in place of assessed value, as the vicinity where land is lowest assessed generally has the worst roads and least statute labor to perform.

STATUTE LABOR ANSWERABLE.

McKellar, Parry Sound District.—Statute labor system is answerable for all the bad roads in Ontario. Most of the work done is an injury to the roads.

TOO MANY PATHMASTERS.

McKillop, Huron Co.—The general condition of the roads is good. The last two summers a grader has been hired to round some of the old graded roads. In repairing the roads I think the gravel is put on too deep and it is not packed until late in the fall and the sides are badly cut up before the centre is packed. I think a statute to only allow not over twenty pathmasters and pay them would be a good law.

WOODEN CULVERTS AND BRIDGES.

Macaulay, Muskoka District.—The culverts and bridges have been mostly constructed of wood and are all crumbling to pieces and will cost a large amount to re-build.

AS MUCH HARM AS GOOD.

Mountain, Dundas Co.—Statute labor is in some parts faithfully done, in some places it does about as much harm as good. Roads are made wide and flat and soon are full of holes. Many roads are insufficiently drained.

COMMUTATION AT ONCE.

Mara, Ontario Co.—I believe forty cents for statute labor commutation would do more work than working the labor in the usual way and I would make commutation of statute labor compulsory at once.

STATUTE LABOR HAS BEEN ABOLISHED.

Malden, Essex Co.—Statute labor has been abolished in this township. Every year the township spends about $1,400 on the general improvement of the roads. We have been getting some crushed stone by going about three miles for it, but now the crusher is in the courts and we fear will not be operated again. Gravel is scarce and of a poor quality. The land in our township is very flat and it requires an enormous amount of ditching to get the water off quickly. Stock is prohibited from running at large. There are about sixty-five miles of road maintained by the township, of which twenty-five are metalled with either gravel or broken stone.

IF CASH COULD BE HAD.

Machar, Parry Sound District.—If cash could be had in place of statute labor I am persuaded that much better roads could be made for the expenditure.

A BIG IMPROVEMENT.

Mariposa, Victoria Co.—We have fairly good roads in most places, as the bulk of them have had some gravel, and the main roads several coats of gravel. I think there might be some improvements in the manner of grading roads as they are too flat on top in most places. The new road built in Lindsay, under, I presume, your instruction, will be a good lesson for this township, as one half of the people passing from this township into Lindsay will pass over that road, and I can testify that it is a big improvement over the old road. The Council spent $675 in purchasing gravel pits last year but that was exceptional.

THE MAIN ROADS NEED GREATER CARE.

Melancthon, Dufferin Co.—The travelled roads in this township are fairly good, but we would require about thirty miles of road which lead to Dundalk, Corbetton, Melanchton, and Shelburne railway stations, to be given extra care in the way of building, so that the road would be able to bear the heavy traffic.

IMPROVING.

Mono, Dufferin Co.—Between $1,500 and $2,000 is expended on the roads each year besides the statute labor. The Township of Mono is rather rough and any amount of hills, and it is hard to keep the roads in good order, but they are improving every year.

IS IT THE SOIL?

Maidstone, Essex Co.—The general condition ot the roads is fair in a favorable season. In spring and fall, however, owing to the nature of the soil, we seldom have good roads. In those seasons even our gravel roads get considerably worked up, and this makes travel over them disagreeable.

THOSE WHO WORK HAVE TO PAY.

Monck, Muskoka District.—In some places statute labor is performed faithfully, and in other places it is not. The council has generally to expend an amount of money equal to fifty per cent. of the statute labor. Statute labor is every year getting more of a farce, and those who work faithfully have to put their hand in their pocket to pay for those who do not work faithfully, causing a great deal of discussion at nominations. Some here think that statute labor is only the relic of the old feudal times as they think they are not working for themselves but for the Queen.

BEGINNING TO SEE IT.

Minto, Wellington Co.—Fairly good, but too much gravel has been put on before the roads were properly graded, the consequence is the roads are too flat on top and retain the water in the spring and fall. I firmly believe a great deal more work would be done, and of a more uniform quality, were the statute labor commuted even as low as sixty cents per day, and many are beginning to see it in the same light.

MORE IMPROVEMENT THIS YEAR.

Medonte, Simcoe Co.—The road machine was kept in use for some time this year and gives satisfaction. More improvement was made in the roads this year then in any previous year, owing to the use made of the machine; and after grading, gravel was applied where needed. Some good substantial pieces of road were made this year.

THIS IS THE SYSTEM.

Monaghan North, Peterborough Co.—The roads are in a fair condition. A very decided effort is on foot to give good roads. We have commuted statute labor at fifty cents per day, and divided the township into three districts, each having a commissioner who supervises all work performed outside of grading which is done by a permanent gang upon the grader, under the foreman who is the operator and directed by the Council. This is working well and in another year, when the people see the results, it will be a great improvement upon the old system.

OWNED BY A PRIVATE PARTY.

Mornington, Perth Co.—There is a road machine owned by a private party in the township and the council employs it for making the roads.

A COMPETENT ENGINEER.

Norwich South, Oxford Co.—Have had a good deal of drainage done under a competent engineer in the past few years, which has a tendency to keep the roads dry, as the water gets away more quickly. In one village, which is incorporated, the road work has been commuted for three years, and the ratepayers find that they get better roads, better jobs, and more work done at a less amount than formerly under the old statute labor.

MORE ATTENTION WILL BE GIVEN.

Nottawasaga, Simcoe Co.—The general condition of the roads is fairly good. Our township is very rough and hilly, and consequently the roads are very hard to maintain, culverts being carried away by freshets, and huge washouts formed on the face of hills. Our roads, notwithstanding, are gradually improving. This is more apparent since the purchase of the grader. There has been no special effort at improvement recently as the township has heretofore been burdened by a railway debt; this being now paid, more attention will be given to roads.

THE ROADS HAVE IMPROVED.

Niagara, Lincoln Co.—The road machine is worked every summer and is very good for grading. The roads have improved since we commenced using it.

ONE-THIRD FASTER.

Oxford East, Oxford Co.—I think statute labor should be done away with, and collect fifty cents per day and let jobs. The road would then improve one-third faster than by statute labor.

POOR, AND GOOD REASON FOR IT.

Pelham, Welland Co.—The roads are poor. Many of them too wide and too flat. When gravel is hauled that which loads the easiest and hence the poorest is taken. The road machine is useful, but there is no uniform system of operating it, each overseer managing it on his own beat. Roads are not, in many cases, put in proper shape before being gravelled. Often they are flat or even hollow in the middle when gravel is dumped in to fill the centre.

CREEK GRAVEL IS BEST.

Plympton, Lambton Co.—Special effort has been made by the purchase and more extensive use of road graders ; and more creek gravel used than ever before, as it is found to be very much the best.

LIKE ALL OTHERS.

Pelee Island, Essex Co.—Stoney ridges, with thin stones, one to six inches thick, and any quantity of stone below that, are conveniently situated all over the Island. The west shore has good clean gravel. Pathmasters are like all others—statute labor is a farce. Some pathmasters allow the work to be done late in the fall.

BETTER TO COMMUTE.

Portland, Frontenac Co.—We would like you to give us a talk on road-making. We think that it would be of great benefit to our roads and road-makers. We believe it would be better if it was compulsory to commute the statute labor if at no more than twenty-five cents per day.

THEY WANT GOOD ROADS.

Rawdon, Hastings Co.—The Municipal Council pays for the gravel and thereby encourages the making of permanent roads Some of our concession lines equal the county gravel roads. Generally speaking nearly every ratepayer wants better roads.

MONEY THROWN AWAY.

Roxborough, Stormont Co.—We need a change in first preparing the roadbed properly and by having good ditches on both sides of the road. Much money has been spent for years, in fact thrown away, owing to this neglect.

SINCE THE AGITATION COMMENCED.

Reach, Ontario Co.—The roads are not first-class, although since the good roads agitation commenced an effort is being made to get our pathmasters to adopt a uniform system, but so far without much success. I am glad the department has sent out this circular, as I believe it will influence councillors to have fuller reports from pathmasters and others engaged in road-making to give statistics which heretofore have not been given in rural municipalities.

ONLY HALF A DOZEN.

Storrington, Frontenac Co.—About sixty-seven pathmasters are appointed, and out of that number perhaps half a dozen know how to make or repair a road. If the statute labor was commuted at forty cents a day and that sum expended by a competent man, I think that the roads would be much better than they now are.

MAY DO IN A NEW COUNTRY.

Sullivan, Grey Co.—The statute labor system does very well in a new country, but it is unsatisfactory and detrimental to good roads in the older townships. There is no definite system in making roads by statute labor, every pathmaster has his own plan—the roads do not show the improvement they should for the amount of labor expended. I am confident if statute labor was commuted at fifty cents for each day's labor and competent men and road machinery employed, more and better work would be performed.

TILE DRAINAGE.

Southwold, Elgin Co.—Grading and gravelling is the order in this township according to the number of miles to be kept in repair. The roads are, in general, good. There is considerable tile drainage along sides of road.

SHOULD HAVE A CRUSHER.

Sydenham, Grey Co.—Our roads are in a poor state, not properly graded. We have very little gravel and find stone broken with the hammer very expensive, and when done not a success, owing to not being able to break it fine enough on top for travel.

MORE WORK IS DONE.

Sarawak, Grey Co.—On two roads, 823 days were commuted at sixty cents per day, and more work is done for sixty cents than for one day's statute labor. All statute labor in older sections should be commuted at fifty cents to sixty cents per day, and road butchering done away with by fifteen butchers for 569 days.

IN THE WAY OF DRAINAGE.

Sombra, Lambton Co.—Considerable improvement has been made in the way of drainage under by-law, a large number of drains being located on the highways throughout the municipality.

THE REPAIR SHOULD BE THOROUGH.

Stephen, Huron Co.—We have as good roads as can be found. I advocated better roads twenty-seven years ago, the result was about fifty miles of gravel road. I had charge of most of the leading roads and although they are fairly good, I could now make improvements on my system. We lay out large sums annually to repair our gravel roads but it is not done to my satisfaction ; instead of spreading a certain amount of expenditure over the whole, not adequate to properly repair, I would repair as far as the money would go to make a thorough repair.

GRATIS WORK GIVEN.

Sarnia, Lambton Co.—There has been some extra gravelling done this year and considerable gratis work given.

A SAVING OF GRAVEL.

Turnberry, Huron Co.—Good average of country roads. No special effort has been made except buying a new road machine at a cost of $235.00 and using it on the roads at a considerable extra cost, but at a considerable saving of gravel. These machines should be highly recommended wherever they could be used. Our council believe they will save their cost in one year in improving the roads.

AN EFFORT MADE.

Tecumseth, Simcoe Co.—Roads in bad condition, but an effort has been made to improve them in purchasing a road machine.

GETTING TOO WISE.

Toronto, Peel Co.—I think the statute labor should be done away with. The people are getting too wise to work faithfully on the roads. I think a commutation of forty cents per day expended by commutation would get a great deal more work done and in a great deal more satisfactory manner.

A GOOD TOWNSHIP OVERSEER.

Thurlow, Hastings Co.—The county has purchased a grading machine which is kindly loaned to aid when a large amount of grading is to be done on a township job. We have a good practical man as road overseer for the township and a very energetic man as county inspector, and I think I can say advisedly that our roads are fairly good.

WELL PLEASED WITH PIPE CULVERTS.

Tuckersmith, Huron Co.—Our roads are said by travellers to be among the best in western Ontario. Some of them are too flat and could be improved by draining. Our main roads are in good condition. Our councils have been very careful of them for a long time. We have commenced this year to use sewer pipe extensively. Have been using some for years and are well pleased with them.

THEY HIRE A MAN.

Thessalon, Algoma District.—All our roads are done by statute labor. We have a road grader and hire a man to run it. It is taken from one road division to another and worked by those using teams to do their statute labor. We could do one-third more work if all the statute labor were commuted.

A RADICAL CHANGE NEEDED.

Tehkummah, Manitoulin District.—I have advocated the doing away of the statute labor system, cut down the commutation tax and purchase a road machine. We need a radical change in our road system. The municipal machinery moves very slowly in the matter. Trust a change will soon take place.

NO AMOUNT ON TOP.

Verulam, Victoria Co.—In those sections where gravel is plentiful and of a good quality the general condition of the roads is very good. In a number of places they lack proper drainage and no amount on the top will make a good road in such cases. In these places the roads are in a very poor condition, being almost impassable. No special effort has been made to improve such roads.

WILL GROW WORSE.

Wallace, Perth Co.—The roads in Wallace are not bad. The grading and gravelling of a central sideroad leading from Listowel to Palmerston since the purchase of the road machine is of great benefit, as the heaviest teaming and greatest traffic is between those towns. The system of pathmasters and statute labor is wretched and will continue to grow worse. A few say twenty of the 105 discharge their duties conscientiously and the others as may be expected, by men who are not paid for their work, and who can not be even reprimanded by the members of a council, who might thereafter suffer from their enmity. A compulsory commutation of even twenty-five cents per day, if judiciously expended, would make such an improvement on our highways as would astonish the natives, *i e.*, supposing statute labor abolished, as it ought to be.

THEY WANT GOOD ROADS.

Williams, East, Middlesex Co.—Our roads in general are excellent. Concession roads, I may say, are all gravelled, and also many of the side roads. Our people are alive to the advantage of good roads, and will not rest contented with poor roads.

SYSTEM NEEDED.

Whitby, Ontario Co.—Better results should accrue from a recognized, continuous system of road repairing, with larger road divisions; or commuting for statute labor whereby longer continuous stretches could be made or repaired in one season, obviating the ordinary patch system and giving continuous good roads on leading lines.

RECEIVING MORE ATTENTION.

Wilmot, Waterloo Co.—A more uniform system of grading is desirable, and since we have the road machine this is receiving more attention. I believe better results would be had if statute labor were abolished and a rate of say fifty cents per dium were charged instead, when road commissioners could be appointed who would carry out a uniform system of grading, draining and gravelling.

EXTRACTS FROM COUNTY REPORTS.

HASTINGS Between 400 and 500 miles of road are maintained exclusively by the county. The County Council appoints a man, during its pleasure, called "the superintendent of gravel roads and county surveyor." He has charge of all gravel roads and county bridges. He devotes all his time to it. Under him are gangs of men each with a foreman. They are employed most of the year and are paid monthly. Over thirty-five years ago, county gravel roads were built and all company roads bought by the county and all roads made free of all tolls.

FRONTENAC. About seven miles of road are maintained exclusively by the county. The County Council appoints an engineer who attends to repairs and keeps the road in an excellent shape.

WELLINGTON. One hundred and forty-eight (148) miles of road are maintained by the county. The roads are managed by commissioners composed of members of the County Council ; the roads within each county council division being under control of members of the division. At the January session each year an appropriation of $50 per mile is granted for maintenance (exclusive of bridges and culverts) Accounts with vouchers are produced at end of year and audited by county auditors. All the foregoing 148 miles have been assumed by the county and purchased from road companies and municipalities. These roads have been owned and maintained by the county for the past thirty-three or thirty-four years. Roads under county management are all macadamized and in first-class state of repair. With the aforesaid annual appropriation they are kept in very good condition.

LENNOX AND ADDINGTON. A number of roads were from time to time assumed by the county, but in January, 1893, the County Council repealed all by-laws assuming county roads. The roads are in a bad condition and rapidly growing worse. No effort has been made by County Council to improve their condition. Good opportunity here for instructor in road-making.

HURON. Some leading roads and all boundary lines are partially maintained by the county.

WENTWORTH. About thirty miles of road are maintained by the county. They are managed by commissioners appointed by the County Council, one road being generally assigned to three commissioners. In 1880, '81, '82 and '83, a net expenditure of about $16,500 was incurred on two roads of a length of about five miles each, assumed by the county and maintained for some years as toll roads. One of the roads were abandoned in 1891 and the other is now maintained as a free road. The roads maintained by the county are, I believe, in fairly good condition.

VICTORIA. There is much need for improvement. The County Council purchased a stone crusher for the use of such local municipalities as will avail themselves of its use to provide better and well prepared metal. It has already been used in the Town of Lindsay. Mr. Campbell, Provincial Road Commissioner, visited Lindsay in June last and addressed the County Council and the Council of Lindsay. Great interest was aroused and a condition of apparent hopelessness has given place to great hopefulness and determination that hereafter expenditure shall be made under proper supervision according to an approved method.

PETERBOROUGH. In January, 1896, a special committee was appointed by the county council to investigate the system of building and maintaining roads in the County of Hastings, and report with suggestions. This report concludes with the following :

" Having viewed the roads, we are thoroughly convinced that the system of construction and maintenance of roads as adopted by the County of Hastings is good and meets with our approval ; and we would recommend, if thought advisable, that this system be adopted by the County of Peterborough.

OXFORD. It has been the custom to appropriate $3,000 each year to be spent by the reeve or councillor in accordance with the equalized assessment or dividing lines between municipalities. At the June (1897) session of the council a commission was appointed to gain information respecting toll roads with a view to purchase.

ONTARIO. The plan for road improvements has been the construction of three roads through the length of the county. The county is seventy miles in length and eighteen in breadth. One road commences at Lake Ontario and runs through the Townships of Pickering, Uxbridge and Scott, with some slight deviations ; another road commences on the Whitby and Port Perry gravel road at Manchester, and runs north through Reach, Brock and Thorah to Beaverton ; a third road runs from Oshawa north through Port Perry to Beaverton, following in some places the county line between Ontario and Victoria. There were expenditures on a road connecting the towns of Uxbridge and Epsom, which are on the secondly above mentioned road. There was also a road extending from Beaverton north through the townships of Thorah, Mara and Rama.

Scugog Island, lying to the east of the Township of Reach, was connected to the mainland and very considerable expenditures were made from this roadway down to the foot of Scugog Island. It was only last year that any sum could be obtained for the improvement of the Kingston road passing through Pickering, Whitby Town and Township, East Whitby and Oshawa. This expenditure, as were many of the other expenditures, was obtained upon condition that the local municipalities would make grants of double the amount granted by the county. There are a large number of isolated grants, not connected with any plan of road improvement. The expenditure for bridges on the boundary line between this county and

York, Simcoe and Victoria have been very large indeed, as has also the expenditure upon bridges over the Black, Talbot and branches of the Severn River.

The road across Scugog Lake, three-quarters of a mile, is maintained exclusively by the county, and is managed by a commissioner who makes reports to the county council as to estimated costs of needed repairs, and also makes repairs which are urgently needed under the advice of the reeves of the municipalities between which it lies. This is a roadway across the head of Lake Scugog, with one small bridge, which cost several thousand dollars

BRANTFORD BOARD OF TRADE.

A report to the City Council on the streets of Brantford was taken up by the Board of Trade, the following memorandum being prepared by a special committee :

Your Committee on City Improvements, to whom was referred the report of Mr. Archibald Campbell, C.E., the Government Roads Commissioner of Ontario, begs to report :

That it views with satisfaction the interest that is now being displayed in this Province, and elsewhere, in the improvement of the public highways, and is convinced that the action of the Ontario Government in creating the office of Roads Commissioner will be productive of very great benefit. In Mr. Campbell, a man eminently well qualified for the important duties with which he is entrusted has evidently been found.

The suggestions that the Roads Commissioner is making from time to time for the betterment of the condition of the thoroughfares of the various municipalities in the Province cannot fail to be productive of valuable results. So far as Brantford is concerned, your committee believes that his recommendations are deserving of most careful consideration by those who are interested in seeing the expenditure upon our public streets made in such a manner as to secure the most permanent results, and at the same time add to the attractiveness of a city of which we are all so proud. Acting upon the authority given us, we have ordered that copies of the report be printed for distribution among the members of the Board of Trade.

It is a source of satisfaction that Mr. Campbell finds so much in Brantford of which he can approve. For our sidewalks, waterworks and sewer systems he has only words of praise, while even in the matter of road-making the concession has been made that more attention has been given to the subject than in the majority of places in Ontario. At the same time, he finds that the system that has been pursued in the past has been faulty. indeed that there has been a want of system, and that there has been a large expenditure of money without adequate results. In this connection, it may be observed that Mr. Campbell probably does the city an unintentional injustice in saying that since its incorporation the sum of $185,035 has been expended upon its streets, because, prior to 1890, when the local improvement system came into operation, much of the expenditure under this heading was made on sidewalks, bridges, culverts, etc. ; this, in addition to the usual expenditure for cleaning, removing snow, etc., from which permanent results are not looked for.

It would be presumptuous on the part of your committee to express an opinion on many of the technical recommendations made by the Roads Commissioner. It is justified, however, in coming to the conclusion, from a purely business standpoint, that it would be the path of wisdom to have our streets permanently made, rather than that considerable sums of money should be annually spent in repair and patchwork without enduring results being obtained. It is certainly deserving of consideration if, in the not distant future, a by-law should not be submitted to the ratepayers, which would provide for the proper construction of some of our principal streets. Whether such permanent work can be done to advantage at the present time is open to question, because so much of the work on our sewers, waterworks, gas service, etc., has still to be done. Had the system been adopted of completing all street connections for such services, as the main work progressed, the proper care of our streets would have been a much easier matter than it is at present. Meantime, as rapidly as circumstances will permit, as much permanent street-making as it is wise to do should be undertaken.

Your committee heartily endorses the recommendation that the city should acquire a steam roller, believing that the experience of other cities has been that proper macadam roads cannot otherwise be made. This is a very important matter, because, in the very nature of things, the great majority of our streets must be made of macadam. and it is desirable that we should have for the purpose the very best appliances. With the roller it would be easy to adopt Mr. Campbell's suggestion that the use of sand and cinders to aid consolidation of the road material be done away with and crushed stone substituted. The results would certainly be more satisfactory, having regard both to the condition of the roadway and the comfort of the citizens. In this connection, it is understood, that the purchase of a rotary screen for the stone-crusher has already been decided upon.

The importance of having established grades for the streets is readily apparent, and uniform grades should as rapidly as possible be adopted.

Without any large additional cost, the appearance of the streets of the city, even as they are at present, would be greatly improved if they were more frequently cleaned than is now done. The proper cleaning of the streets is always an incentive to householders to improve the condition of the lawns and boulevards abutting. Besides, clean streets would give our local wheelmen much less excuse for riding on the sidewalks than they have at the present time.

A matter that is deserving of more serious attention than has yet been given it in Brantford is the proper curbing of all the streets and the laying out of boulevards upon uniform lines. At present, nearly all work that has been done under these headings has been at private expense, which is not only unjust in itself, but there is in consequence a great deal of raggedness and irregularity even on our best residential streets. With the boulevarding once properly made, the public spiritedness of the citizens might fairly be appealed to to maintain it in order. The up-keep of lawns and boulevards would also be facilitated if the hours for lawn watering were made more liberal.

As to the recommendation that the driveway on our streets should be narrowed so as to lessen the cost of construction and maintenance, while at the same time giving greater room for boulevarding there are many things to recommend this course, and so far as our present system of street drainage makes it possible, this plan should be adopted.

Before leaving this subject, your committee would call attention to the statement made by Mr. Campbell, that the funds placed at the disposal of the civic officers entrusted with the maintenance of the city's streets are altogether inadequate for the end in view. For the future it will undoubtedly be necessary to deal with this important department more liberally than has been done in the past.

As to bicycle side-paths, your committee would endorse Mr. Campbell's position, that the best way to please the wheelmen is to improve the general condition of all the city streets, rather than to make narrow paths here and there. There should not be a street in the city upon which a wheel might not be ridden with comfort and with safety.

All of which is respectfully submitted.

REPORT ON THE STREETS OF THE CITY OF GUELPH, ONTARIO.

To His Worship the Mayor and Members of the Council of the City of Guelph:

The importance of well paved streets has not been sufficiently appreciated by the cities and towns of this Province, and it is gratifying to find that Guelph, among other progressive cities and towns, is becoming interested in the matter. Much money has been wasted in many municipalities through ill-advised expenditure arising out of an indifference founded on the idea that the streets are as good as they can be made; that the methods which have held ever since the time of the first settlers are the only methods, and that streets are of little consequence in any case.

Good streets are of prime necessity to the welfare of a city. They are the object of an annual outlay which, if wasted, reacts in a two-fold manner by increasing taxes, and at the same time permitting the evils of bad streets to remain; and it should be understood at the outset that the object of the road and street reform movement is not to urge increased expenditure but to obtain a better use of the money now expended.

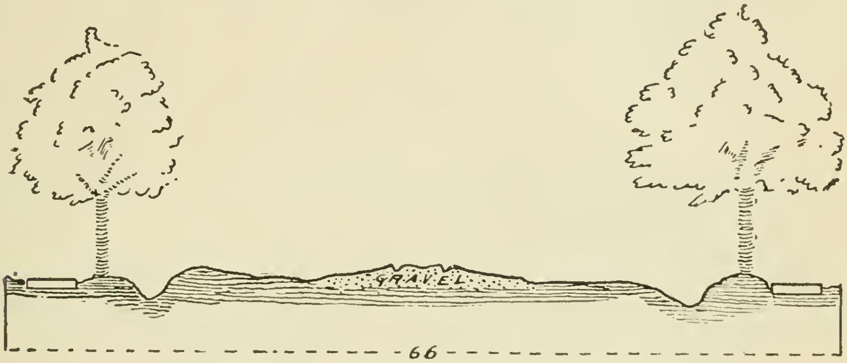
The defects most observable in the street system of Guelph arise from the fact that durable and permanent work is not undertaken; in order to correct which there is need of reforming the present system of street management in two particulars—the method of expenditure, and the method of oversight.

The Expenditure.

The expenditure should not be distributed over the whole street area in patchwork and repairs, but a reasonable amount should be provided for permanent work. Small sums of five, ten or one hundred dollars quickly eat up an entire yearly appropriation, whereas one-half this appropriation spent in properly macadamizing a few blocks would in a few years revolutionize the condition of the streets in Guelph.

An expenditure to the amount of about $5,000 annually is divided among the different streets and wards of the city, and this is again subdivided by the ward representative in doing odd jobs here and there. It is not spent in accordance with the needs of the work, but as certain electors think it should be spent. The logical outcome of the system is that this money becomes a legitimate campaign fund ; the people expect it, and the Council has no other course to pursue. It is the inevitable result of such a system that too much money is provided for one piece of work, and not enough is devoted to another —usually the latter. It is productive of shoddy roadways, and is always wasteful in the end.

Guelph has been making an effort to keep in repair a class of roadways not suited to the traffic over them. They might be considered fairly good township roads. Cheap in first construction, they are expensive to maintain, and after a term of years are very costly. The repairs made to these streets are supposed to be such as will eventually provide a solid roadway ; but this method of sinking stone in the mud year by year, and in the spring carting off the mud which has been forced to the surface, is an extravagant and useless process, which will not make streets. The waste that arises is of a two-fold nature, combining high taxation and bad streets. It is not to be supposed that streets can be built without money, but when the expenditure is made, as now, it should be to provide good streets.



Cross-section of a Street under the Old System.

In order to get the best results in street construction, the work has to be undertaken on a proper scale. A roadway, like a house or any other structure, should be built from the foundation upwards, and should be completed, if only in short sections, before it is used. The roadbed should first be graded, under-drained, and otherwise prepared to receive the gravel, broken stone or other road metal ; which last should be placed on the roadway with proper machinery and in accordance with the best principles of road-making. To do this, the expenditure, now extended over a term of years on a badly formed roadway, should be concentrated so as to secure permanent and durable work.

To this end there are three courses open : 1. To set apart a portion of the present annual appropriation. 2. To issue debentures for the amount necessary to do finished work. 3. To adopt the frontage tax system.

Oversight.

The oversight should be delegated to a competent supervisor, preferably an engineer instead of being left to the council or a committee of the council.

On business principles there is every reason for placing this work in the hands of one man. Street construction is a matter requiring experience and special training. The plan of leaving it to the councillors is the pathmaster system of the towns. It is even more objectionable in the towns, since the streets demand more skill than do country roads. The supervision of street construction should rest with one who has a knowledge of the subject, together with good business ability.

The engineer would prepare plans and specifications for all work. These having been submitted to, and passed upon by the board of works and council, he would further relieve the council by taking full direction of the work. An engineer is now in the employ of your city for certain purposes, and his duties should be extended to include the management of street improvement and maintenance.

CLASSIFYING THE STREETS.

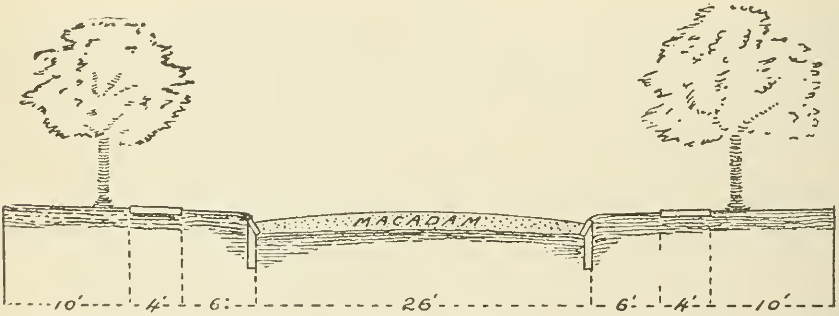
One of the first duties of the engineer in arriving at a plan whereby street improvement may be undertaken systematically would be to classify the streets according to the traffic over them, the character of the street, whether a residential or business thoroughfare, the nature of the soil, grades, etc., with the object of discovering the strength, etc., of roadway required.

It will be seen that such streets as Wyndham, Macdonnell and Quebec, the main business streets, have a large amount of heavy traffic over them to the depot, and that a strong form of pavement is needed.

Another class would evidently include such thoroughfares as Eramosa road, Woolwich street, Paisley street, Gordon and Norfolk streets, over which traffic from the country reaches the centre of the city. That these are residence streets, and that the travel is less severe than on the main streets, should evidently influence the character of the pavement.

A third class would include such streets as are residential, but are not called upon to support either heavy or frequent travel, and the roadway should be built accordingly, at a correspondingly less cost.

By placing before the council such a report upon the streets, showing the present requirements, the probable future requirements, the special improvements in the way of culverts, grading, etc., your council would be in a position to undertake the improvement of the city streets on an intelligent basis. At present there is no definite object in view. When permanent improvements are undertaken, much of the work now being done will be found premature or unnecessary, and will be torn up. This is specially true of the grading and the coatings of broken stone and gravel.



A WELL-DESIGNED STREET.

Cross-section showing sidewalks outside the trees and roadway curbed with cedar.

There should be definite plans, which successive councils can follow, and toward which all work and expenditure will tend.

CHOICE OF PAVEMENT.

With an abundance of stone easily obtained, broken stone pavements are the most suitable which can be had for heavily travelled streets in Guelph. The excessive width of the street allowances is adverse to the use of vitrified brick or asphalt in the business sections, as the cost would thereby be much greater than in the majority of towns. For less travelled streets, gravel would be suitable. Macadam roadways are growing in favor in towns. They are pleasant for driving, wheeling, and, if properly constructed and maintained, are handsome in appearance.

EARTHWORK.

The present practice in Guelph is to merely spread the crushed stone over the travelled roadway, without having prepared the subsoil to receive it.

The first step in properly constructing a macadam roadway is for the engineer to take a series of levels on the streets, so that a suitable grade may be decided upon. The width of roadway to be metalled can then be staked out, to be excavated in accordance with the required grade, and to form a receptacle for the stone.

To properly grade and excavate will frequently necessitate the handling of a good deal of earth. This earth should be used as far as possible in levelling the sides of the streets and filling in low lots adjacent to the roadway, disposing of the remainder as circumstances may dictate.

DRAINAGE OF ROADWAYS.

Good drainage is essential for all classes of pavement, and none more than macadam. It must be understood that it is the natural soil which really sustains the weight of traffic, and that broken stone piled on a wet soil cannot be made sufficiently strong to support heavy vehicles, and water permitted to accumulate and stand on the surface of the roadway will cause the pavement to be rapidly churned into ruts and mud.

Underdrainage by means of common field tile is very often necessary. Water falling in the form of rain passes at once through the soil until it reaches a strata of rock, compact clay or other impenetrable layer. If there is an outlet along the strata or rock or clay it will issue in the form of springs. If not, it will rise higher and higher in the soil above the strata through which it cannot pass, just as water poured into a vessel will rise higher and higher until it reaches the top, when it will overflow. Tile drains provide an outlet for this water before it reaches the surface of the soil, and thereby maintain a firmer foundation of earth on which the broken stone may rest. These tile drains should be placed at a depth of about three feet.

Surface draining is provided by rounding up (crowning) the surface of the roadway, thus draining the water to the gutters at the sides of the road, which latter are so graded as to permit the water to flow along them to suitable outlets. Deep ditches are not needed, but the road should be curbed and the angle between the surface of the road and the curb will serve as a sufficient waterway. The surface drainage is further aided by a coating of broken stone or gravel. And it is of prime importance that this coating should be made smooth, hard and compact by rolling so that water will not pass through, thereby softening the earth supporting it.

FOUNDATION.

A firm, unyielding foundation is an absolute necessity for any kind of pavement. This is one of the chief defects in the roadways of Guelph. All road coverings, whether broken stone, asphalt, stone blocks, vitrified bricks, wooden block, form merely a wearing surface. The weight of the load must be borne by the foundation beneath. The natural soil, if kept in a dry state, will support any load. The practice in Guelph appears to have been an effort to cover and fill up wet places by dumping into them loads of broken stone, rather than by removing the water in drains. In this way, the roadways on many of the streets are raised away above the elevation of the sidewalks and adjoining property.

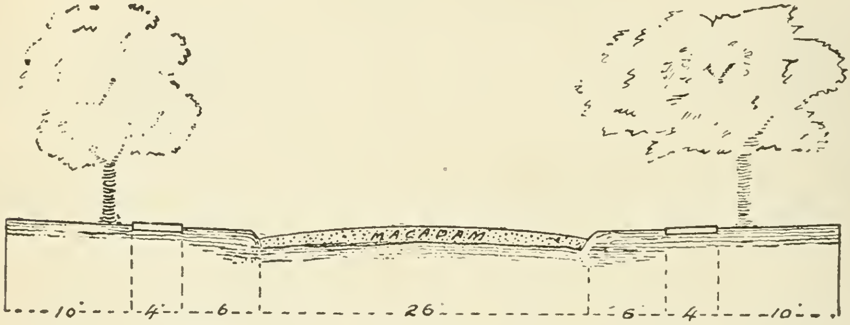
A foundation for a macadam road is obtained by drainage of the roadbed, and thoroughly consolidating it with a roller. In certain cases, especially on clay soils, and for the most durable class of broken stone roads, a foundation layer of large stones may be placed on edge, the projecting points being chipped off and wedged into the interstices. But for ordinary cases, the layers of crushed stone may be placed directly on the natural earth.

A ROAD ROLLER.

A roller is of first necessity in the construction of macadam roadways. It is needed first to compact the earth on which the broken stone rests. The stone or gravel is then placed in the roadbed in successive layers of about four inches thickness, each layer being consolidated before the next is applied.

The present method is to spread the stone over the roadbed, leaving it for traffic to consolidate. When done in this way the stone is forced down into the soil, and the soil comes to the surface in the form of dust, which has to be carted away every spring. There is no real bond between the stones thus mixed with earth.

But when, by rolling, the subsoil has been thoroughly consolidated and the metal has been placed on the road in a compact coating, each stone of which is wedged firmly, there is a mechanical clasp which will not yield to at all the same degree. The stone covering becomes, under a roller, a roof as well as a floor, and will not permit the water to pass through and soften the earth foundation below; but, being smooth, and properly crowned, the water is at once shed to the gutters.



Cross-section of an Improved Street Without Curbing.

A CRUSHER.

Stone could be broken to much better advantage for the streets of Guelph by the use of a crusher.

The stone crusher should have a screen attachment whereby the stone could be separated into various grades according to size, the larger stones to be placed in the lower layers of the roadway and the finer on top. The grades frequently are:

1st. Such as will pass through a $2\frac{1}{2}$ inch ring.

2nd. Such as will pass through a $1\frac{1}{2}$ inch ring.

3rd. Such as will pass through a 1 inch ring.

4th. Chips and dust screenings.

When stones are laid on the roadway, large and small indiscriminately, the smaller wear more quickly than the larger and a rough surface will result. The larger stones have a tendency to loosen, as their bearing is not so perfect, and they will be found rolling under the feet of horses and under the wheels of vehicles.

A crusher with screen attachment is needed also to properly utilize the gravel of the vicinity of Guelph. It is of very irregular size, ranging from large boulders to sand, and contains a large amount of clay. One pit on the western side of the town is a complete mass of boulders. By placing a crusher and screen in the pits, and passing the material through, the material would be broken into a suitable size, and the clay and sand would be removed. In dry weather clay and sand assist in making a smooth road, but in wet weather they retain moisture, soften, diminish the strength of the roadway, ruts rapidly appear and the roads "break up." Clean material of proper size is necessary, and, to this end, a crusher with screen attachment should be obtained.

SEWERS.

Sewers have not yet been laid in your city. This is a matter which is closely connected with sanitary conditions and deserves the very serious consideration of your council. That sewers are needed, especially in the central portions of the city, there can be little doubt, and further delay can be but very small economy, if it can in any sense be considered economy. The streets most in need of sewers are those most in need of pavements. It therefore becomes of greatest importance to give these matters early attention.

Sewers should be laid before the streets are paved, since to open a macadamized street to lay sewer pipe causes an injury to the pavement which cannot be easily repaired Sewers and paving are matters which should be considered together for various reasons, one worthy of mention being that drainage of the roadbed can be very much aided by a sewerage system.

If a sewerage system were designed for the city, and portions laid in the main streets, these could at once be paved. The sewers could then be extended and the paving done concurrently on the lateral or less important streets.

The fact that sewers are needed and that permanent pavements cannot be laid immediately on the main streets does not lay aside the urgent need of a road roller and a rock crusher. There are some streets which will not require sewers for a number of years to come, and these could be properly macadamized at any time. In any case these machines can be used on streets of the kind at present used in Guelph to very great advantage, a plan which has given much satisfaction in Brockville for a number of years, which city possesses a fifteen ton steam roller.

SOME ILLUSTRATIONS.

It may emphasize the foregoing remarks to point out that a large sum of money was spent last year in resurfacing Carden street, but for the want of a crusher to properly break and grade the material, and a roller with which it might be consolidated, the roadway is a practical illustration of the wastefulness of trying to do work without proper implements. Fine gravel and sand were used in covering the stone. This became very smooth during the dry weather, but is being rapidly destroyed in the wet seasons, turning already into mud and ruts.

A grading machine is used in Guelph, but it is almost useless to go to the expense of grading a street without rolling it. By the use of a grader alone a good shape can be given to the road, but when rain comes this loose material is at once saturated, wheels churn it, and the condition of the street is often injured rather than improved. If, after the street is properly shaped by the grader, a heavy roller were used to compact the material a smooth hard surface would be formed. Such a surface would throw the water to the gutters and would make a very serviceable roadway for light travelled streets.

With an immense amount of stone in every part of the city, the large sums of money which have been expended on the streets should, all must agree, have placed them in very much better condition. They are without shape or form and indicate thoughtless, careless management.

IN CONCLUSION.

The City of Guelph bears a royal name, the location is not an accidental one, but was chosen because of its many advantages and the excellence of the surrounding country. This has evidently been appreciated by your citizens who, in their public buildings, private residences, and the general features of a city, have studied closely the civic welfare. In the matter of streets, which should, under proper management, be converted into park-like stretches, something has been done in the way of narrowing the roadways, laying artificial stone walks, and providing handsome shade trees.

Much, however, remains to be done. While your citizens may feel that the streets are as good as those of many other towns and cities of the Province, the streets of other towns and cities are generally bad. Under the favorable conditions which exist in Guelph the streets should be superior to those of other towns. The people of other towns are becoming aroused to the necessity of improved streets, and there is every probability that this satisfactory feeling of equality will be endangered. The towns of Galt, Stratford, Woodstock, St. Catharines, Niagara Falls and others have purchased steam rollers and crushers, while a number have decided upon the same or equally important steps in the near future.

In the preparation of this report the object has been to outline briefly the essential features of a good system of management. Many important points have received mere mention, while details have been pretty generally avoided. The document will have served its purpose if successful in directing your attention to a very important matter and creating a more lively interest which, if aroused among the citizens as well as in the council, will result in great benefit to your city.

I have the honor to be, gentlemen,

Your obedient servant,

A. W. CAMPBELL,
Provincial Road Commissioner.

DEPARTMENT OF AGRICULTURE, ONTARIO,
22nd day of December, 1897.

EXTRACTS FROM A REPORT TO THE CITY OF ST. JOHN, N.B.

STONE BLOCK PAVEMENTS.

Stone block is the oldest of paving materials; is extensively used in cities, and is the strongest and most durable that can be had. It is well adapted to grades up to ten per cent., yields little dust, requires little repair and suits all classes of traffic. It is, however, very noisy and is rather rough. It is therefore not suited to residence streets nor business streets on which there are retail stores and offices. It is best adapted to streets such as Water street, on which there is a large amount of slow, heavy traffic. It should be used also on steep grades in place of asphalt.

The stone generally used is granite or trap. Excessively hard stone wears to a smooth surface and becomes slippery. No examination or test which can be made of stone is perfectly satisfactory in distinguishing the best variety. Different kinds of the same stone and even stone taken from different parts of the same quarry, have different wearing qualities. The trap rocks of Carleton Heights, or the quartz diorites at the end of Sandy Point, will prove satisfactory. Quartzites, of which varieties are found at the west of Lily lake, on the slope of the ridge north of Douglas avenue and on the road to the lake after passing Seely street, are apt to wear away too rapidly. White marble, of which some is found back of Lily lake and elsewhere in the vicinity, is too soft.

The stone blocks should be cut into rectangular blocks about seven inches deep, three inches wide and nine inches long. The price paid for quarrying and making these blocks will average about thirty dollars per thousand. Slabs of a kind which can be handled by one man are split out in the usual manner. These are sub-divided into sections corresponding to the size of the paving blocks, which are then trimmed and finished.

In constructing a stone block pavement the natural earth is first prepared by draining, grading and rolling with a steam roller. On this a layer of concrete is laid, say six or eight inches in thickness, according to the traffic to be supported. On this is spread a layer of sand about one inch in thickness, and in this the stone blocks are embedded.

The blocks are laid stone to stone in courses at right angles to the street line and so that the joints will be broken. A slight variation in the size of the blocks is permissible as regards depth and length, but the width (if three inches as previously specified) should be exact.

On hills and grades a better foothold for horses may be obtained by using rough-finished blocks, or the blocks may be so embedded in the layer of sand on a slight incline in such a way as to present a series of steps. At street intersections the blocks are laid obliquely in what is termed the "herring-bone" fashion so as to give a secure foothold to horses turning the corners. The joints between the blocks are filled with sand and tar cement.

The State of Maine, adjoining New Brunswick, is one of the largest producers of stone paving blocks.

ASPHALT.

The materials of which asphalt pavements are composed may be either natural or artificial. Natural asphalt is obtained by grinding to powder bituminous limestones found in Texas, Utah and elsewhere, or the bituminous sandstones found in California. Kentucky, Texas, etc. This powder is then heated until soft and it spread while hot on the roadway. The chief source of artificial asphalt is the Island of Trinidad, W. I., where crude asphaltum is obtained, is then refined and mixed with sand and stone dust; is heated and applied to the roadway.

Owing to the skilled labor and machinery needed in laying this pavement it is, in the great majority of cases, laid and kept in repair by contract. When properly laid its durability cannot be questioned, but there is some difficulty in surrounding a contract with such safeguards as will ensure first-class material and workmanship. A reliable company should be employed and the maintenance of the pavement guaranteed for ten or fifteen years. A common guarantee is for a term of five years, but this is not sufficient. Breaks in asphalt pavement must be immediately repaired, otherwise they quickly shear off under wheels, and the size of the hole increases with great rapidity.

On the business streets of St. John, where the traffic is severe, where noise is objectionable, and where smoothness, cleanness. ease of travelling, are desirable, stone blocks are not suitable. Asphalt is the most durable material filling these conditions. It is not, however, suitable for steep grades, and stone blocks would necessarily be retained for grades greater than three per cent. Nor should asphalt be used between and adjacent to street car tracks. The gutters, too, should be formed of concrete or flagstone, as asphalt decays rapidly from the effect of moisture.

VITRIFIED BRICK.

Vitrified bricks for street paving are different in composition and manufacture from the ordinary building brick. They are made from shale, or clay, or a mixture of the two, which is heated to the point of vitrification and then slowly and gradually cooled. The size of each brick is about $2\frac{1}{2}$ x 4 x 8 $\frac{1}{2}$ inches. They are laid in the same manner as stone blocks, viz., in courses at right angles to the direction of the street, with broken joints, etc. The durability is not equal to that of asphalt or stone blocks. But they are less noisy than stone blocks. The pavement is adapted to business or residential streets on which the qualities, but not the strength, of asphalt are required. They are manufactured in the Province of Ontario, in the States of Ohio, New York, and Pennsylvania and elsewhere. There is room for much variation in the quality of brick. The process of manufacture is one which requires an expensive plant and much skill in burning. The composition of clay or shale used is of great importance. It may contain, for example, too much lime, which will destroy the brick on exposure to moisture. Care must therefore be taken in selecting the brick to be used.

WOOD PAVEMENTS.

Cedar blocks and pine pavements have been used in St. John to some extent. In Canada and the United States wooden pavements are very much in disrepute. They have been found to decay rapidly, settle unevenly, become rough and unsanitary, absorbing filth and giving off bad odors. Much of this is unquestionably due to the methods of constructing these wooden pavements in this country.

In England and France they are regarded with favor, but the timber used there is carefully selected, so as to exclude any blocks showing signs of decay. Oblong blocks are cut all of equal size. They are treated with creosote, tar, and other preservatives, and are laid on concrete foundations. Some soft woods are used, and the life of such pavements is about ten years. The best wooden pavements are made, however, from Australian hardwoods, particularly the jarrah, karri and other of the eucalyptus woods of South Australia.

In the absence of actual experience in this climate with wooden pavements constructed in the careful manner outlined in the foregoing paragraph, their use cannot be recommended. Certainly cedar block and pine pavements as commonly laid in this country are not a success and should not be tolerated.

COST OF PAVEMENTS.

In the matter of cost most pavements, including macadam, require pretty much the same expenditure up to a certain point—the completion of the grading, under-drainage, curbing and excavating, preparatory to receiving the paving materials. Up to the layer of concrete the cost, excluding macadam (that is for asphalt, stone block, vitrified brick and wood pavements), is very much the same, but may vary according to the depth of concrete used and the material for curbing, whether stone or wood. As I have no data for calculating the amount of grading, excavating and drainage needed in St. John, it becomes impossible for me to make an estimate of the cost of the work applicable solely to your city.

The following indicates the basis for a strong form of pavement, on which the cost of a macadam roadway twenty-seven feet wide, for a resident street, may be estimated per lineal feet:

Excavating and grading roadway	$0 30
Grading boulevard	6
Water and sprinkling	4
Rolling	10
Crushed stone in the street at $1 per cubic yard	1 00
Drainage	10
Total per lineal foot of street	$1 60
Total per square yard	0 53⅓

With cedar curbing, 4 x 12, the cost would be $1.72 per lineal foot or 57⅓ cents per square yard; with stone curbing, $2.80 per lineal foot or 86⅔ cents per square yard.

In estimating the cost of an asphalt pavement to replace the cedar block on such a street as Main street, with a roadway forty feet wide, the actual cost would be about as ollows:

Removal of cedar blocks and excavation per lineal foot	$0 44 4-9
Drainage per lineal foot	15
Concrete, six inch layer, per lineal foot	2 22 2-9
Asphalt surface, per lineal foot	4 44 4-9
Total per lineal foot	$7 26 1-9
Total per square yard	1 63⅜

The maintenance is usually estimated on a basis of eight cents per square yard per annum. The cost, therefore, for a five years' guarantee is 40 cents; ten years, 80 cents; fifteen years, $1.20. The total cost then under a five years' guarantee is $2.03⅜; under a ten years' guarantee, $2.43⅜; under a fifteen years' guarantee, $2.83⅜. In the above estimate the profit of the contractor on initial construction is not included and is regulated by competition.

Asphalt pavements, as previously stated, are laid by contract. This material is one which can be greatly adulterated and it will usually be advisable to have the work done by a reliable company under a long term guarantee. Recent inquiry shows that Ottawa has had rock asphalt pavements laid, with maintenance guaranteed for fifteen years, for $3.10 per square yard; Montreal has had rock asphalt pavement laid, guaranteed for a similar term, for $3.09. Trinidad asphalt, maintenance guaranteed for ten years, has cost in Montreal $3 43 per square yard; Toronto, $2.60; in Hamilton, $2.15. Montreal paid $2.85 for Trinidad asphalt on a five years' guarantee. The apparent disparity in these prices may be accounted for in part by differences in specifications regarding drainage, concrete foundations, and as regards special work on gutters, curbing, etc.

For a roadway of the same description as that on which the cost for broken stone was computed, twenty-seven feet wide, an estimate for brick pavement would be as follows:

Excavation and grading roadway, per lineal foot	$0 30
Grading boulevard	6
Concrete, six inch layer	1 50
Drainage	10
Brick surface laid	3 45
Total per lineal foot	$5 41
Total per square yard	1 80⅓

The following is an estimate of the actual cost of laying one square yard of stone block pavement, on a basis of the whole of the work being performed by the city. Labor on street railway allowances would be slightly more expensive:

Stone in quarry	$0 10
Quarrying stone	25
Making blocks	1 20
Hauling	10
Laying and grouting	75
Removal of old pavement, excavation, grading, etc	13
Drainage	5
Concrete, eight inch layer	67
Sand coating	5
Total per square yard	$3 30

THE FRONTAGE TAX SYSTEM.

In connection with the frontage tax system, inquiry is frequently received respecting the form of by-laws necessary. The following by-law of Blenheim, Kent county, a town having about 2,000 population, appears to be very complete, and should serve as an excellent basis for other places adopting this system :

Whereas it is deemed desirable to provide for certain improvements, works and services being paid by special assessment on the property benefitted :

Be it therefore enacted by the municipal council of the corporation of the Town of Blenheim, in the County of Kent, as follows :

1. This by-law may be known and cited as "*A By-law respecting Local Improvements and special assessments therefor.*"

2. Unless the context otherwise requires, the following words and expressions in this by-law shall have the meaning hereby assigned to them respectively, that is to say :

The words "local improvement," "work," or "service" shall mean any improvement, work or service, the cost of which may be charged by the council under any of the provisions of "The Municipal Act of Ontario" against the real property immediately benefitted, by way of special assessment.

The word "owner" shall be construed and deemed to include a leaseholder, the unexpired term of whose lease (including any renewals therein provided for) extends over a period which is not less than the duration of the proposed assessment, if the lessee has covenanted in his lease to pay all municipal taxes on the demised property during the term of said lease, and would be liable for the taxes for the proposed improvement.

The word "Inspector" shall mean such person as may be appointed Inspector of Public Works by the Municipal Council of the Town of Blenheim.

The words "Engineer," "Clerk," "Treasurer" and "Board of Works" shall mean "Engineer," "Clerk," "Treasurer" and "Board of Works" of the Town of Blenheim.

The word "corporation" shall mean "The Municipal Corporation of the Town of Blenheim."

The word "council" shall mean "The Municipal Council of the Town of Blenheim."

3. From and after the first day of May, A.D. 1895, all future expenditure in the Town of Blenheim for the several classes of works, improvements and services hereinafter mentioned, for which (amongst others) special provisions are made in section 612 of "The Consolidated Municipal Act of 1892," that is to say :

A. Making, enlarging or prolonging any common sewer.

B. Opening, widening, prolonging or altering, macadamizing, grading, levelling, paving or planking any street, lane, alley, public way or place, or constructing any sidewalk.

C. Curbing, sodding or planting any street, lane, alley, square or public place.

D. Re-constructing, as well as constructing, any of the said works or improvements shall be by special assessment on the property benefitted and not exempt by law from assessment.

4. In the opening, widening, straightening or extension of streets, where the whole cost of the improvement is assessable against the property fronting or abutting upon the street or portion of street to be opened, widened, straightened or extended, the owners of the land to be taken for such opening, widening, straightening or extension must dedicate the same to the town free of cost, and no such street shall be opened, widened, straightened or extended unless the land required therefor has been so dedicated to the town free of cost, notwithstanding the fact of a petition sufficiently signed having been presented for the said improvement; provided this prohibition shall not apply in any case as to which three-fourths of the members of the council present at any meeting thereof

shall vote that it is in the public interest that the street should be opened, widened, straightened or extended at the expense of the properties abutting thereon, notwithstanding the refusal of the owners of the property required therefor, or of some of them, to dedicate the property so required.

5. In making every assessment to defray the cost of the construction of pavements, sidewalks and sewers, the Engineer shall make an allowance on corner, triangular and other irregularly shaped pieces of land situate at the intersection or junction of streets, as follows :

On lots having an angle of ninety degrees, an allowance of one-third the number of feet on the side of the lot to be assessed ; on lots having an angle of more than ninety degrees, an allowance of less than one-third the number of feet on the side of the lot to be assessed ; on lots having an angle of less than ninety degrees, an allowance of more than one-third the number of feet on the side of the lot to be assessed, as may in each case, in his opinion, be deemed just and equitable, having due regard to the situation, value and superficial area of such lot, as compared with adjoining lots and pieces of land assessable for such improvements, works and services.

6. Any allowance made in pursuance of the next preceding section may be charged on the real property fronting on the improvements, or be assessed as a portion of the town's share of the costs of such improvements, in like manner as the intersection of streets, or partly on both, in such proportions as may be deemed just and equitable by the Engineer, and the cost of any portion assessed against the town shall be provided in like manner as in the case of street intersections.

6a. In every assessment to defray the cost of the construction of pavements, sidewalks, and sewers, where the said improvement fronts upon lands which are by law exempt from taxation for the said purposes, the amount necessary to construct that portion of the said improvement fronting upon the lands so exempt as aforesaid may be charged on the other real property fronting on the improvement, or be assessed as the town's share of the cost of such improvement in like manner as the intersection of streets or partly on both, in such proportions as may be deemed just and equitable by the Engineer, and the cost of any portion assessed against the town shall be provided in like manner as in the case of street intersections.

7. Any allowance or assessment made in pursuance of the last two preceding sections shall be subject to appeal to the Court of Revision, and from the Court of Revision to the County Judge, as hereinafter provided.

8. In the construction of any granolithic, stone, asphalt or brick sidewalk the municipality shall assume forty per cent. of the cost thereof, in addition to any other portion which may be assumed by or assessed against the municipality, and the said forty per cent. shall be added to that portion of the cost of the construction of said sidewalk to be provided by the municipality, as in the case of street intersections.

9. All matters of small pieces of sidewalks and other improvements, the cost of which can be estimated and reported upon by the Inspector, shall be referred to him, and shall be reported upon by him, in the same manner as if referred to the Engineer, and in such cases the word Inspector shall be taken as meant Engineer.

10. All costs incurred in carrying out the construction of any improvement, work or service, other than the construction itself, the overseeing of the same and providing the necessary funds, shall be borne by the municipality, and may be provided in the same manner as in the case of street intersections, or charged to the general fund, as the council may by resolution determine.

11. No work or improvement for which it is proposed to assess the real property immediately benefitted, as for a local improvement, shall be undertaken by the council unless and until the provisions of this by-law shall have first been complied with.

12. All petitions for local improvements, works or services to be made, done and performed under the provisions of this by-law, shall, as soon as received by the Clerk, be examined by him, and it shall be his duty to ascertain and finally determine whether the

same are signed by two-thirds in number of the owners, representing at least one-half in value, exclusive of the value of improvements, of the lands benefitted, according to the last revised assessment roll of the municipality, and liable to special assessment for the proposed improvements, works or services, and such petitions when found to be correct, as aforesaid, shall be numbered by him in the order they are received, and be entered at length in a book to be kept for that purpose, to be called the " Local Improvement Book," and the Clerk shall endorse upon such petition his certificate of the correctness thereof, and of the value of the whole of the real property (exclusive of improvements aforesaid) rateable for the proposed improvement, work or service, and shall forthwith so transmit the same to the Engineer. In case the petitions shall be found to be insufficiently signed, they shall be so certified by the said Clerk, and forwarded in like manner to the Engineer for his consideration.

13. Upon receipt of any such petition the Engineer shall forthwith examine into the subject matter of the petition, and report with as little delay as possible upon the necessity for, or the advisability of, undertaking the proposed improvement, work or service, and the reasons therefor, and particularly whether in the case of drains and sewers the same are desirable or necessary for sanitary or drainage purposes.

14. In the event of the Engineer reporting in favor of the undertaking of any such improvement, work or service, he shall also, after due and proper examination and inspection, report :—

A. What real property will be immediately benefitted by the proposed improvement, work or service, and the measurement of the frontages liable to the rates, and those exempt from taxation ;

B. The probable lifetime of the improvement or work ;

C. An estimate of the probable cost of the proposed improvement, work or service, and the amount thereof, which shall be assessed against the property to be immediately benefitted ;

D. The proportion in which the assessment is to be made on the various portions of real property so benefitted.

15. In the event of the adoption by the council of the report of the Engineer recommending the undertaking of any such improvements, work or service, it shall be the duty of the clerk to give all necessary notices to property owners as hereinafter provided and as provided by the statute in that respect, and make all necessary special assessments on such property immediately benefitted as aforesaid, pursuant to the statutes.

16. In any case when the engineer or board of works shall have recommended the undertaking of any improvement work, or service as a local improvement, and shall have recommended that the cost thereof shall be assessed against the real property immediately benefitted, although there be no petition therefor, or the petition therefor shall not have been sufficiently signed, and in any case when the said engineer or board of works shall have recommended the construction of any works, or the making of any improvement for sanitary or drainage purposes, the engineer shall, after due and proper examination and inspection, ascertain, determine and report, as hereinbefore set forth, and make the necessary assessment, and when such report and assessment has been approved of and accepted by the council, it shall be the duty of the clerk :

A. To cause a notice of the intention of the said council to undertake such proposed work, improvement or service, and to make such proposed special assessment, to be given in a public newspaper published in the Town of Blenheim, once in each week for two successive weeks, and the said notice shall state generally the nature of the proposed improvement, work or service, the estimated cost thereof, the property reported by the engineer as immediately benefitted, and estimated amount to be charged as a special assessment against the lands immediately benefitted, and that unless a petition against the proposed improvement, work or service and the proposed special assessment, signed by a majority of the property owners, representing at least one-half in value of the real property proposed to be assessed, according to the last revised assessment roll, be presented to the council within one month from the last publication of the said notice, the proposed improvement, work or service will be undertaken, and the special assessment therefor will be made by the council.

17. In the event of a petition being presented to the council against any proposed improvement, work or service, and a special assessment therefor, within the time limited by the notice, the Clerk shall report to the council whether the same is sufficiently signed by a majority of the owners of the real property proposed to be assessed, representing at least one-half in value of said property, according to the last revised Assessment Roll.

18. In the event of no petition, or no petition sufficiently signed, being presented within the prescribed time, the clerk shall forthwith cause a notice at least fifteen days before the day appointed for the sitting of the Court of Revision, to be given or mailed to the owners and lessees or agents of such owners and lessees having a right to petition, of the real property mentioned in the report of the engineer as being immediately benefitted, in the form of Schedule " A " hereunto annexed, stating the time and place of meeting of the Court of Revision for the hearing of appeals, and ten days notice shall also be given in some newspaper published within the municipality, of the time and place of meeting of the said court, which notice shall specify generally what is the nature of the improvement, work or service, and what property is proposed to be specially assessed as immediately benefitted, and the time and manner in which the same is payable, and the said notice may be in the form " B " hereunto annexed.

19. The engineer, clerk and solicitor shall attend the meetings of the Court of Revision, and the said court shall sit at the time and place given in the notices given as aforesaid, and shall hear and determine all appeals which may be brought before it, pursuant to the provisions of the statute in that behalf.

20. In the event of any property owner appealing from the Court of Revision to the Judge of the County Court, the clerk shall proceed forthwith to procure an appointment from the Judge for the hearing and disposal of the appeal.

21. In the event of no appeals from the Court of Revision, or so soon as any such appeals shall have been disposed of by the judge, the clerk shall forward a certified copy of the report of the engineer, with any alterations or amendments which shall have been made by said Court of Revision or judge to the council.

22. Upon the receipt of such report as last before provided, it shall be the duty of the board of works to call for tenders for the construction, making or doing of the proposed work, improvement or service, and report the result to the council, recommending the awarding of the contract, or recommending the carrying on of the work by the inspector or engineer or under his supervision, and asking that funds may be provided for carrying on the work to completion.

23. In the event of the council adopting the report of the board of works awarding any such contract for any such local improvement, work or service, or the doing of any such work by the inspector or engineer, the mayor and treasurer shall make such arrangements with banks or other persons or bodies corporate, pursuant to the provisions of the statute in that behalf, as may be necessary to provide the amount of money required to carry on such local improvement, work or service, to completion, in anticipation of the special assessment therefor, and no such contract or agreement shall be executed, or work proceeded with, until such financial arrangements shall have been made.

24. The engineer, upon receipt of notice that a contract has been awarded, and the necessary financial arrangements therefor have been made, shall forward the specifications, plans, drawings and all other proper and necessary material, together with the accepted tender, to the town solicitor, who shall, with as little delay as possible, prepare the necessary contract and bond of security.

25. Upon the contract or agreement being duly executed, and not until then, the board of works may authorize the improvement, work or service to be proceeded with, and carried to completion.

26. After the completion of any such improvement, work or service, and after the entire cost thereof, including compensation for damages (if any) shall have been ascer-

tained, the engineer shall certify the total amount thereof to the treasurer, showing by such certificate what amount is chargeable to the property benefitted, and what amount is chargeable to the town at large.

27. The treasurer shall, as soon as possible after the receipt of the report of the engineer, under the last preceding section, ascertain the amount properly chargeable for interest on the advances made, and the estimated interest which will accrue thereon until the necessary assessment shall have been made, the necessary by-law passed, and the debentures to be issued thereunder shall have been disposed of, and moneys provided to retire the temporary loan, and certify the same, together with the amount shown by the engineer's report distributed as before provided, to the council.

28. Upon the adoption of the last mentioned report the council shall, with as little delay as possible, proceed to make the necessary special assessment upon the property immediately benefitted, and upon all other assessable persons, bodies corporate and property, pursuant to the provisions of the statute in that behalf.

29. The engineer, treasurer and clerk shall furnish the solicitor with all statements, calculations and other information, as may be required by him to enable him to prepare the necessary by-laws, providing for levying and collecting such special assessments, and for borrowing money by the issue and sale of debentures.

30. Any person whose property has been assesed for any improvement, work or service, under the provisions of this by-law, may pay the amount of such assessment, less the interest, at any time before the preparation of the debentures, in which case the amount of debentures shall be proportionately reduced.

31. When a by-law shall have been passed, making the construction and maintenance of works and improvements at the intersection of streets and opposite properties exempt from local rates, the subject of a general rate or charge, the exemption from general rates shall not extend to the item included in the by-law respecting yearly rates to meet the expense of such improvements and works opposite such exempt properties and at the intersection of streets.

32. In cases where the improvements or works are provided for by section 612 of "The Municipal Act," no real property or any owner thereof shall be entitled to the benefits of the provisions of the said Act and of this by-law in respect to exemption from any general rate during the year in which the by-law providing for any local improvement shall have been passed; and where any by-law for a local improvement provides for the issue of debentures, such debentures shall not be issued before the 30th day of December next after the passage of such by-law; and no special rate shall be collected in respect of any such by-law during the year in which the same shall have been passed.

33. This by-law shall come into force and take effect on, from and after the final passing thereof.

Finally passed, signed and sealed in open council this eleventh day of March, 1895.

JOHN W. GIBSON,
Clerk.

JOHN F. TITUS,
Mayor.

FORM A.

To ....

You are hereby notified that the Council of the Corporation of the Town of Blenheim proposes to pass a By-law providing for the
The total cost of the said improvement as estimated by the
is the sum of $ and the said improvement is proposed to be carried on as a local improvement, and be paid for by special assessment on the real property immediately benefitted, as the same appears by the report of the
dated the day of 18 on file in the Clerk's office. Your real property, which will be immediately benefitted by the said proposed improvement, consists of feet frontage on the side of said upon which it is proposed to charge an equal proportionate part of the cost of the said improvement, having regard for the whole assessable frontage on said , the same to form a special assessment upon your said lands, according to the frontage thereof, and be payable in equal annual payments, at the same time as your general municipal taxes, such payments to be sufficient to cover annual interest and form a sinking fund for the principal sum or debt incurred for said improvement. The Court of Revision will sit for the confirmation of the Overseer's or Engineer's report upon the lands assessable and in which said special assessments are to be made, for the said improvement, at the Town Hall, on day the day of A.D. 18 at the hour of o'clock in the noon, at which time and place all appeals against the same will be heard.

I am, your obedient servant,

FORM B.

Public notice is hereby given of the sitting of the Court of Revision at the Town Hall, Blenheim, on day, the day of A.D. 18 , at the hour of o'clock in the noon, for the hearing of appeals, pursuant to the Statutes in that behalf, respecting the proposed
and the special assessment of the cost thereof upon the lands immediately benefitted, pursuant to the report of the Overseer or Engineer, dated the day of 18 .

The estimated cost of the said improvement is $ payable in equal annual instalments, sufficient to cover interest at the rate of per centum, per annum, and a sinking fund for the payment of the said principal sum, and the lands proposed to be especially assessed therefor consist of

Dated at Blenheim, this day of 18 .

ANNUAL REPORTS

OF THE

BUTTER AND CHEESE ASSOCIATIONS

OF THE

PROVINCE OF ONTARIO

1897

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

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CONTENTS.

BUTTER AND CHEESE ASSOCIATION OF EASTERN ONTARIO— Page.

Annual Meeting 1
- President's Address: D. Derbyshire 1
- Economy, Kindness and Cleanliness in Dairying: W. J. Palmer 5
- Cheap Food for the Dairy Cow: John Gould 6
- Canadian Foods: Prof. J. W. Robertson 14
- Science and Practice in Dairying: Prof. H. H. Dean 21
- The Curing of Cheese: J. A. Ruddick 23
- Experiments in Cheese Making: Prof. H. H. Dean 27
- Hints on Curing and Store Rooms: Prof. J. W. Robertson 29
- Bacteria and Dairying: Dr. W. T. Connell 31
- Butter Making: Marcus Sprague 36
- The Theory and Practice of Butter Making: J. A. Ruddick 38
- The Model Creamery and Cheese Factory: Prof. H. H. Dean 43
- Canadian Food Products in Great Britain: W. T. Crandall 46
- Cold Storage: Prof. J. W. Robertson 47
- Report of Instructor Bensley 49
  - " " Howey 50
  - " " Kerr 51
  - " " Lowery 52
  - ' " Purvis 53
  - " " Zufelt 55
  - " " Publow 56
- The Dairy and the Silo: Joseph Gould 58
- The Typical Dairy Cow and Her Demands on the Dairyman: John Gould 60
- Fodder Plants: Wm. Saunders 67

BUTTER AND CHEESE ASSOCIATION OF WESTERN ONTARIO—

Annual Meeting 77
- Directors' Report 77
- Report of Inspector Millar 79
- The President's Address: A. F. MacLaren 81
- Report of Instructor Morrison 91
- Report of Instructor Clarke 93
- Government Co-operation in Dairying: Prof. J. W. Robertson 94
- Good Roads and the Dairy: A. W. Campbell 99
- Report of Instructor Sprague 104
- In an English Dairy: Laura Rose 109
- Our Agricultural Wealth: C. C. James 112
- A Practical Discussion 117
- Presentation of Medals 125
- How Milk is Secreted: Prof. H. H. Dean 127
- The Farm Well and its Contents: F. T. Shutt 131
- Summer and Winter Creameries: H. B. Gurler 135
- Cold Storage: Prof. J. W. Robertson 140
- The Theory and Practice of Butter Making: J. A. Ruddick 143
- Dairy Legislation: Prof. J. W. Robertson 153
- Improved Opportunities in Dairying: H. B. Gurler 159

APPENDIX—

Lists of Members 165

Lists of Officers 171

Financial Statements 173

BUTTER AND CHEESE ASSOCIATION

OF

EASTERN ONTARIO

ANNUAL MEETING.

The twenty-first annual convention of the Butter and Cheese Association of Eastern Ontario was held in Lindsay on the 11th, 12th and 13th of January, 1898, the day sessions being held in the Town Hall, and the Tuesday evening session in the Academy of Music.

At most of the sessions fully five hundred farmers were present, and the keenest interest was manifested. The Mayor and business men of the town were active in welcoming and entertaining the members of the Association, and the complimentary banquet on Thursday evening was a most pleasing and successful event.

PRESIDENT'S ADDRESS.

By D. Derbyshire, Brockville, Ont.

It is a great pleasure to meet with the citizens of Lindsay and the dairymen of this important section, and I desire on behalf of our Board to thank the leading men of this vicinity for the energetic way you have assisted our secretary, Mr. Murphy, and committee in making final arrangements for holding this convention. We have a good staff of speakers with us, and everything points to a very successful meeting. This is our first convention held since we amalgamated as a Butter and Cheese Association, and I am delighted that the uniting of our dairy forces in this Province should have taken place in the Diamond Jubilee year of the reign of the greatest sovereign that has ever sat on the British throne. I am sure I can speak for the dairymen of this Province. and say that we all join most heartily in wishing her most gracious majesty, Queen Victoria, many years yet of health and happiness to sway the sceptre and guide the destinies of the world's greatest empire. (Applause).

Our Central Advisory Board has worked harmoniously, holding several meetings, devising the best means of carrying on our work uniformly throughout the Province, and I am pleased that our efforts have been so successful. Our instructor, Mr. Sprague, has certainly done excellent work, and all we asked from our Governments has been cheerfully granted.

The year 1897 has been the banner year for our dairymen. We have made and exported more butter and cheese than in any single year before; given more instruction to our creameries and cheese factories, and made a finer quality of both than in any former season. Our exports from Montreal from the first of May to the 20th of November, 1897, were 220,200 packages of butter, against 157,321 packages in 1896, or a gain of nearly 63,000 packages, or $800,000 more for butter than in 1896. During the same period we exported 2,100,000 boxes of cheese, or an increase of 370,000 over 1896, or a gain of $2,570,000, and for butter and cheese $3,370,000 more than during the same period in 1896. I think this a splendid showing. I have carefully estimated our make of butter and cheese for all 1897, and am sure our dairymen in this country will realize $20,000,000 or $4,000,000 more than last year.

Besides holding our annual conventions at Brockville and St. Marys, we have held a large number of meetings, giving the best instruction possible, educating our dairymen to weed out the common cows, to keep only those that would give the quantity and quality of milk, to improve their stables, having them warmer, better ventilated and lighted, growing corn and building silos, and impressing our people with the great necessity of cheaper production. We sincerely believe that the greatest question before us to-day is cheaper production, and our Board recognizing this have done all in their power to keep this one subject before all our friends. Better cows, cheaper milk of a better quality at less cost, should be the aim of every farmer in Ontario. Our dairy schools are improveing each year. The Kingston School has been greatly enlarged, and I am glad to say that all our dairy schools have a larger number of bright young men in attendance now than ever before. So we are sure to have finer quality. We held meetings at each of our dairy schools for makers who were unable to attend the whole term, and I am glad to say these were largely attended, with good results, and I believe we should continue this, and all our educational work with greater zeal the coming year. We have everything to encourage us. Our Minister of Agriculture, Hon. Mr. Dryden, has given us every encouragement, attending our conventions, enlarging our dairy schools, adding to them the very latest and best machinery, and giving us a liberal grant so we could carry on our work of education and instruction with greater efficiency. The Hon. Mr. Fisher, Dominion Minister of Agriculture, has carried out his promise, and given us refrigerator cars on our railways and apartments specially fitted up on our steamships for carrying our dairy products safely to the British market. We feel thankful to the Hon. Mr. Fisher for attending our annual conventions, giving practical advice and assisting us throughout the year. We are especially pleased with the great service Prof. Robertson has rendered us in every possible way; no one can estimate it; always waiting, apparently to give us the right assistance at the right time. So I say we have every reason to be encouraged for the future.

Will we be worthy of this great heritage and the advantages that surround us? The intelligence you have displayed in the past leads me to believe that a majority of our dairymen will. If the factory in your neighborhood is not fitted up properly, or is an old, cold building, make arrangements to have a new up-to-date one put in its place; or unite two small ones, and make one good one so you can handle the milk every day in the year. Resolve to-day that you will do all in your power to improve your surroundings in every possible way, and we will all have the great pleasure at our next annual convention of recording another advance, not only in the quantity produced, but the most important point of quality.

I think there is one more point I should say something on, and that is selling regularly, both butter and cheese. If we produce more milk and a finer quality, and get it to a factory that is up-to-date, well equipped for receiving same, with a better qualified man to handle it, and a finer quality is turned out, will the salesman hold this improved product until it begins to deteriorate in quality before selling? I sincerely hope not, but that he will sell every week, and keep our goods in the consumers' hands, all the time, when they are fresh and in their best condition. We are here in convention to-day for the very purpose of examining our past record, and devising means for better work in the future, and I candidly believe the greatest mistake made in 1897 was holding our product off the market, expecting to force prices up, instead of keeping every one of our customers supplied weekly. We have too large a make going on everywhere to treat our English friends in this way. When we finally did get ready to sell, our product had deteriorated in quality, and did not give the satisfaction our weekly shipments earlier in the season did. I believe our friends will remedy this the coming season. Then if I could get you all to promise to keep a better cow, have better stables, more and better food, and give more attention to regularity in feeding milking, etc., we could rest assured that 1898 would see greater prosperity among our dairymen than ever before. Will you go forward? I want to mention that our Board of Directors for 1897 have worked together harmoniously; in fact it has been a great pleasure to meet those gentlemen and to see their loyalty to the cause. Our secretary, always alive to our wants, had done splendid service. Our venerable treasurer has guarded the funds carefully. Our instructors have vied with each other in the performance of their arduous duties, and I shall always, look back with pleasure on the great work of this Association for the year just closed.

COMMITTEES.

The President named the following committees :

Business : His Worship the Mayor of Lindsay, Messrs. Carlaw and Whitton.

Nominations : James Whitton, J. R. Dargavel and Wm. Eager.

Finance : T. B. Carlaw, E. J. Madden and John McTavish.

Legislation : Wm. Eager, Henry Wade, T. B. Carlaw.

Materials : G. G. Publow, G. Beasley, A. P. Purvis.

POINTERS FROM VISITORS.

Mr. JAMES WHITTON, Wellman's Corners, who, with Messrs. Carlaw and Madden, had made first arrangements for the convention to be held in Lindsay, was called upon for an address, and told of the hearty manner in which the people of Lindsay had responded to the call made upon them. The President's address, he said, was a bright and hopeful one and was only the first of the many good things to come before the convention. As a Canadian dairymen he was proud to learn of the great advancement made by the industry in 1897, in both the butter and cheese branches. He then continued : You know that we have captured the World's markets in cheese, and I am bold enough to prophesy that whoever lives for ten years will also find that we will have captured the butter trade of the world, too. I recently sent some butter to an English firm, and upon testing it a letter was sent me pronouncing it first-class. We who are producing butter and cheese must look chiefly to the cost of production. We cannot control the market end, but we can direct and control the first-cost of the milk, and in fact the first cost of all farm products. We must aim to get all our products taken off the farm in the most condensed form, and not in a bulky and necessarily costly condition. Coming to Lindsay once I noticed a fellow hauling a load of oats to the market—a bulky form of product—and he could not have got more than $10 for it. Had that man better stables, better cows, and a better dairy education, he would not have been hauling in $10 worth of oats, but a load of butter worth $300 or $400.

The PRESIDENT : Yes, worth $1,000.

Mr. WHITTON : That's so. I sent in a load of butter last week worth $1,000, and I can assure you it would take many a load of oats to get that amount of money. Dairying as now practised will tend to keep our sons and daughters on the farm.

Mr. E. KIDD, North Gower : I have been a member of this Association for many years, and have watched with interest and pride the growth of the dairy business. The wonderful increase in the cheese industry has been due almost entirely to the work of the dairy Associations. Twenty-seven years ago we were groping in the dark, but the conventions of this Association let in light, and it has given instruction through various other channels. It is really hard to say where and when the progress will end, for if we keep going on instead of having 60 per cent. of the British cheese trade we will soon have 75 per cent. We made a great mistake this year when we stopped sending on cheese weekly to the old country, and I trust so costly an error will not again be repeated. (Hear, hear.). A great many of us then thought it was the buyers who were holding back the cheese, but time has told us that it was not their fault. Just as soon as we stopped sending other countries began to send in inferior cheese, and the prices went down on that account, and we had consequently to accept lower prices until the market resumed its tone. In any event, cheap production should be the main object of the man who furnishes the milk to the factory or creamery. That is the end of the business the farmer should pay most attention to. In fact, we farmers are manufacturers Our cattle are really animated machines, turning their food into milk or beef. We send that milk to our factories, and there it is manufactured into cheese or butter by the makers employed by us. If we do not furnish this material cheaply, the maker cannot make cheese cheaply so as to take advantage of the market. We are living in a fast age, and we must keep up a rapid and steady pace if we would not be left behind by our competitors, who are swarming into the British markets from almost every country on the globe. However, we of the Dominion of Canada are living in the grandest country of all, and there is no better part of it after all than eastern Ontario. I used to think that our friends further west in the Province had better land and better opportunities, but I now believe that we can make just as good an article, and have as much profit in it, and we are nearer the market. The question comes plainly before us: Shall we go into the grain growing, beef raising or into the making of butter and cheese? We cannot afford to raise oats and sell them at 25 or 30 cents per bushel any longer. Nor can we afford to sell barley at the low prices prevailing. The great west is the best place for raising cattle for beef cheaply. We have then dairying to fall back on, and it is a means of steady support. Shall we turn our milk into butter or cheese? That is largely a matter of local conditions, for either or both are usually safe and profitable. The dairy industry is the hope of Ontario.

Mr. T. B. Carlaw, Warkworth, said that as one of the directors he was pleased to be present, particularly as he had been the man to first name Lindsay as the meeting point. He could only repeat what he had said when the location of the 1898 convention came up for settlement: "Lindsay is the spot." Already a successful gathering was assured.

Mr. John R. Dargavel, Elgin: I understand that this Midland section has not been as long in the dairying line as our county of Leeds. Leeds is not naturally a fertile section; we have not so many broad acres of good land as you have in the country of Victoria; but we have there proven that dairying is a profitable branch of agriculture, and our land is the better and not the worse for the industry. Had you come to our county, and seen it apart from the dairy business, I doubt if you would have taken a farm for a gift. But if you looked closely, and saw the condition of our dairy farms you would soon change your opinion, for you would see many signs of prosperity. I am, of course, closely interested in dairying, but my business is mainly mercantile; and thus I came closely in contact with the farming community, and few have better opportunity than I for knowing that the prosperity of the farmers of a part of the county of Leeds is due almost altogether to the dairy industry. I speak advisedly when I say that I do not believe there is one farm in twenty in our locality that has a mortgage on it (applause), and we owe that proud position to the dairy interest; and that interest has come to the front there largely through the efforts of this Association. You can readily understand that no person can make much of a success of any special business without experience, unless assistance is got from reliable outside sources. A child has no knowledge to begin with, and must learn from others or from his own painful experience. The purpose of this Association is to instruct and inform, and save losses from unpleasant experiences. Let us endeavor to acquire our dairy knowledge in its best form. Already the dairy Association of this Province have given valuable information; and they are still giving instructions and helping those who would help themselves. You here in the Midland district have the advantage of our earlier failures We went into dairying when many now established points had to be settled. You will not have to repeat our losses; you may, however, repeat our more profitable experiences; you can avoid our mistakes, and imitate our successes. Will you take advantage of the information so freely offered you? I have often felt really sad when I saw some of my neighbors attend farmers' institutes and listen to the addresses and agree with what was said, and still a large proportion of them would not take advantage of and put to practical use what they heard. This Association is striving to do missionary work in the dairy line, and there is nothing that pleases us more than when we see good results from our work. However, much of the instruction of this Association has borne fruit, and we are making good progress as the years go on. If you believe that what you hear about dairying at this convention is the best course to pursue, go home and at once put it into practice. Dairy knowledge is useful only to the extent that you practically apply it.

The President: A few years ago the position of Commissionership of Agriculture was considered of secondary importance, and was a sort of side-office of the Provincal Treasurer. Any requests made by agriculturists had to await the more pressing claims of the Provincial finances. To-day we have a Minister of Agriculture, who is a practical farmer, and who gives his whole attention to the Department. (Applause.) We have built and extended the work of the Agricultural College, and have several dairy schools in operation in the Province. The Dairy Associations of Ontario are worthy of all support, for they have done much to keep the Government advancing along agricultural lines.

ECONOMY, KINDNESS AND CLEANLINESS IN DAIRYING.

By W. J. Palmer, Toronto.

There are two or three things that farmers should bear in mind if they would make a success of dairying. In going through the country giving instruction with the Travelling Dairy, I observed that there were opportunities for improvement in the way of kindness to animals, in cleanliness of stables and milk houses, and in the matter of economy—a wise and generous economy, so to speak. Those of you who have been farming for years, know that to-day you must practise economy to a degree that you were never called on to do before. You cannot feed as liberally—as wastefully—as you did before; you must husband your resources very carefully if you would make a living. Your sons will have to make a further change in their methods of feeding live stock if they are to succeed in dairying. You are not now horse-feeding as much as formerly. The horse used to get nearly all the attention, kindness and feed, while the poor cow was neglected as of but little importance; but there is little profit in horse-raising to-day, and so we are turning our attention to the milch cow as the hope of Ontario agriculture. But even to-day there is too much waste in managing dairy cattle. I am in the milk and butter business in Toronto now, and in going around among the men from whom we are getting our supplies, I have noticed a good deal of difference in the way they attend to their cattle, and the amount of money they make out of their milk. I have noticed some places where the cattle are very rough looking, and the owners are making very little out of them. I met a man recently in the Niagara district who, according to his own statement, could make a handful of grain go further in feeding cows than any professional dairyman could. He said he could feed a cow on $10 a year, and get more out of her than any of the scientific chaps who were teaching and lecturing people how to feed cattle could do for $40. But he made one statement that I think gave him away as an authority on feeding live stock. He said he had kept hens until they were fourteen years old, and that they had laid better than when two years old, and that he had one hen which he killed when twenty years old, and it was as tender as a spring chicken. (Laughter.) A great deal depends upon how cattle are treated. Down in my native province of Prince Edward Island I have known farmers who brought in fine fat cattle fed almost entirely upon turnips. They would bring in a pig almost fat enough to burst which had been fed upon but little else than butter-milk. How was this done? They supplemented their comparatively poor feeding with much kindness. I can assure you that kindness goes a good way in the thrift of live stock. The cost of producing the milk needs to be very closely studied. If it costs you 80 cents to produce a hundred pounds of milk, and you receive only 70 cents a hundred for it, you are a loser, and the more milk you handle the more you lose. But if you make milk for 30 cents a hundred, and you can get 70 cents a hundred for it, you are making money. In order to do this, however, you must have warm stables, well lighted and ventilated, and cleanliness and kindliness must prevail. If you will curry-comb and clean the cow as carefully and regularly as you do a horse it would pay. Every time you scratch that old cow for a few minutes with the comb she will give you a few pounds more milk. We sometimes find cow stables very cold—perhaps as low as 40 degrees, while across the way there is a stable comfortably warm.

My experience with city customers leads me to the conclusion that one of the most important things in the butter trade is to have the print, pat or package in a clean and attractive form. The place where the cheese or butter is made cannot be too clean and pure. Our inspectors are doing much good, and our dairy products are greatly benefited by their work, directly and indirectly; but I am afraid that we still have too much butter made up in unclean and illy ventilated quarters. We have a place in Toronto where bad butter is bought at five cents a pound, and made over again, and then sold for fifteen cents a pound. The consumers are getting more particular every year. No one will knowingly pay a good price for turnipy butter, and they will not want it the second time at any price. It is a pity that notwithstanding all that has been said against feeding turnips that some will persist in using those roots. If only one patron of a creamery or factory will use turnips it will affect the whole make. Turnips are unpopular with city customers; they blame it for nearly every taint or bad flavor in milk or butter. Even "leeky" flavor has been attributed to turnips. A point in dairying worthy of closer attention is to the putting up of butter in neat packages. The taste is often governed by the eye. Butter put up in attractive style generally finds a ready sale; if it has no style in its make up it is not so likely to be called for. I have known a lady to send back a pound of butter because she did not like the taste of it, when she really was objecting to its appearance. That same butter was made up in a neat wrapper and again sent to her, when she declared that it was the nicest butter she ever tasted. (Laughter.)

Let me emphasize the question of flavor. Our best patrons ship their creamery butter to us every day. They have everything neat and clean and pure about their stables and general surroundings. They aim to have the same flavor every week. Butter made at home cannot have the same evenness of flavor. We get thirty cents a pound for first-class creamery butter, while for much of the farm butter but little more than twenty cents can be had, because it is likely to vary in flavor. If your cream has a bad flavor heat it up to 150° to drive off that bad odor, then cool it down and churn it, and you will have butter that will realize a good price. Do not take white butter to the market; it looks lardy. Color it to suit the taste or preference of your customer. A man said to me once, "If they want green butter make it green for them." If you have not a liking or a love for dairying you had better go into some other line of business.

CHEAP FOOD FOR THE DAIRY COW.

By John Gould, U.S. Special Dairy Agent, Aurora, Ohio.

After expressing his great pleasure at being once more with the Association in covention, and making playful allusions to the seal question and other matters, the speaker proceeded: I may say without fear of authoritative contradiction that a good, productive cow in Ohio or Ontario is worth more than six dozen seals in Alaska uncaught, and the dairy industry is worth immensly more than this matter which now causes a flutter of annoyance between the two great sister nations. (Applause.) One of the most serious things confronting us in our business as farmers, is the question of raising cheaper food elements which can be turned into good dairy products. For when you find a dainty pat of butter, or a well-finished and attractive cheese, it is only recomposed hay, corn or grain—transformed by the cow into milk by the digestive process, and turned into the finished article by the trained maker. Our cows are therefore the first stage of the machinery which puts this food into the highest type of table luxuries. If these dairy products are not of the highest grade, it is because somewhere between the barn and the factory, something detrimental has fallen into the milk. At a recent convention of dairymen a chart was exhibited, which showed that only thirty-six cents worth of soil fertility had been sold in a whole ton of butter, and I heard the remark made by a witty fellow, that this would have been reduced to nine cents, if the old cow had not got her foot into the pail. (Laughter.)

A short distance from my home over in Ohio, is an old, delapidated iron foundry. When I was a boy they took bog iron ore from a near-by mine, and, using charcoal made from the neighboring forests, turned the ore into pig iron, and finally took it many miles to another establishment where it was turned into iron bars and other material. To-day no charcoal is to be had there, and the old iron foundry is silent. But not far from the site of that old foundry, on the lake side, is the Otis Steel Mills, bringing its coal from the south, and getting its ore from Lake Superior. Up to date machinery takes that iron ore, puts it into the great furnace, and before it is allowed to become cooled, it comes out at the far end of that mill a perfectly finished steel rail. And that is why the old foundry disappeared. That bog ore furnished only twenty-two per cent. of finished iron, and the charcoal cost a good deal. The transportation of the pig iron to the far away rolling mill also cost considerable. To-day the Steel Company's fleet brings the iron from Lake Superior, and lays it down upon its own wharf at Cleveland, and the coal is put down beside the ore, and the latest machinery takes that ore and turns it into the best of finished steel at a minimum of cost. There is sixty-eight and above per cent. of Bessemer steel in the ore they use to-day. The coal used in that immense establishment costs only $1.80 a ton laid down at the door of the mill. To-day they make steel rails cheaper per ton than the old foundry could turn out pig iron.

A few years ago my good old grandfather was milking a brindle cow. He milked her a little while in the summer, when the weather was warm When the weather turned cold, that cow dried up, and she then boarded with him until spring. (Laughter.) Sometimes grandfather's brindle cow was a martyr to dairy methods ; and many a man's barn in those olden days was festooned in the spring with cow hides. Then some man got a better cow, and milked her for ten months. Somebody else began to experiment, and found out that there was better butter than even "Mrs. Jones" could make. And this butter was too good to be sold over the counter in a store where codfish was given in exchange for butter, pound for pound. It was wrapped up a little better than the store butter. It pays always to exhibit taste in putting up butter. The man with the better cow, better and more cheaply fed, and better taken care of, with his milk better handled, not only got more for his product, but had a remunerative industry going *all the time* on his farm. You see it is on a parallel with the iron furnaces. What do we keep a cow for ?

The PRESIDENT : To keep body and soul together.

Mr. GOULD : I see that the President, like the learned author of "Proverbial Philosophy," and good old John Wesley, of pious memory, believes that the cow has a soul. If he be correct in his guess, some of the cows will have a better time in the hereafter than their owners, and it will be a rather bad look out for us when that long string of live stock comes up before us when the great account is added up. A boy once answered that question by saying, "To keep the cow alive." What is a "live" locomotive ? We came here behind one. Fire placed in the furnace, heating the water in the boilers, produces energy, and that means in railway parlance a "live" engine, and that locomotive properly handled, and guided, brought us along. A dead locomotive has not much "go" in it. We want to feed a cow also to produce animal heat. "But," a man asks, "If you feed to produce heat, why is it necessary to feed in the warm summer, when there is so much heat ?" I have a brief answer to that, which is that a piece of dead cow even in June is a pretty cold bit of beef. (Laughter.) Let me illustrate : Figuratively, there is a man sitting before me who got out of wood last week ; and I never knew a farmer who did not have to burn a rail once in a while. My friend went to the swamp and brought back a load of white birch wood. Now why did his wife object to that load of white birch ? It could not be made to throw out only flashy heat, needed oft replenishing, and the fire went out quickly, and the result was that while the good woman was baking her bread, the side next the fire was burning and smoking, while the other side of the loaf was so soft that it could travel over the side of the baking tin. The man did not like the look of things, nor his wife's outspoken remarks, and so he went back to the woods and got a cord of good, clean, straight maple, cut last year, and nice and dry. When he got it nicely piled close to hand,—farmers always have a good wood-house—he came to his wife and said, "Well, Mary, come out and see the nice lot of wood

I have got you now." She went and looked at the wood, and then looked at her spouse, and said, "Oh, John, how nice that wood is; you are always better to me than I deserve." (Laughter.) Now he knew that was a white lie (laughter), but he took it in good grace, and tried to persuade himself that he was the best husband in the neighborhood. Mary put three sticks of wood into the stove, and soon had a hot, even heat in the oven, and the second batch of bread was a pronounced success. Why is not one bit of wood just as good as another? Over in our country the average man puts in his cows in November, and begins to feed them hay. Why does he feed them with hay? Why, he does it to warm them. Now, let us consider whether we will furnish our wives with white birch wood, and also ask ourselves whether it is best to feed our cows with food that is analogous to this white birch, or to give them food which is better and cheaper than their ordinary winter hay ration. The food that will make the best red, rich blood in the cow is best represented by oats. We must give our animals a portion of protein, which in common language is what we know as white of eggs, a substance found more abundantly in some grains than others, but some is contained in all the grains. Oats, as I have said, are a good food on this acccount, although protein is more abundant still in peas and in oil meals. Then there are what we call the starchy foods, which we also must feed, five times more abundantly than the protein. We find most starch in meadow hay, and in corn, and corn fodder. A cow needs about five pounds of starchy or heat producing food to one of protein, or flesh and blood making food. The proportion of a well-balanced ration, is, therefore one of albuminoids or protein foods to five of such starchy or heat and fat producing foods as corn, corn fodder, timothy, and fine hay and root crops. Hay is a splendid food for cattle if it were not so expensive. I once thought that nothing was so good as hay for a return in the milk pail, but I have changed my opinion. I suppose that over here in Canada where you are feeding so much hay, you must raise seven or eight tons to the acre.

VOICES: No; no. Only a ton and a half.

The PRESIDENT: Can you do it in Ohio?

Mr. GOULD: No; we can do no better than you can with hay. But we would have to raise seven or eight tons an acre if the feeding of it to milch cows to any great extent is to be made to pay. Now, a ton and a half of hay, the average yield of an acre, contains about 1,080 pounds of starch, and the remainder of it, save a little protein content, is worth little more than woody fibre for feeding. In other words, a ton of hay produces only about 720 pounds of nutritious matter. It is worth about $7 or $8, and that means that you are paying about a cent a pound for your digestible starch. In addition you have to spend time in feeding the cow, but that does not amount to much with some men, as the cow puts her time against theirs. What is the effect of feeding a cow upon nothing but a little hay through the winter?

The PRESIDENT: She can go through a smaller hole in the spring than in the fall.

Mr. GOULD: Yes; and some of them finally have to go through a sausage machine; as they are too tough for anything else. (Laughter.) In order to give the cow a cheap and nutritious ration you must plant corn, and then feed it in the best way, which is by means of the silo. I have seen a good deal of corn in this country as I passed through, but it was not covered, and often it would have to be chopped free from ice with an axe to get it to the feeding stables. Now that is not a means of grace; nor is it likely to put a man into a proper frame of mind on Sunday morning. Look at the corn plant for a moment. I would place a fair yield of ears at eighty bushels. If that corn and fodder has been properly cared for, the day it was ready to cut up it should contain 4,800 pounds of digestible starch per acre, as against 1,080 pounds in the case of hay. You can raise an acre of corn for $10, and for that cost get 4,800 pounds of starch, or nearly five pounds of starch for a cent; while in the case of hay you have to pay about a cent a pound for your digestible starch—at least worth that to sell as hay. In this dairy business we are coming into competition with the world: not merely with the man in this, or the adjoining county, or the man in New York, but with the fellow in Denmark, Holland and France, and also with the fellow in Australasia, in which country they have summer conditions to-day, while we in North America have our overcoats with us, and are willing to wear sealskin caps until we reach the U. S. boundary line. I heard a man say the other day that if a farmer would only use it, a lead pencil would be worth $1,000 to him in his business. A lead pencil is not carried by the farmer who guesses; the man who figures with a lead pencil usually knows. I went to a bank the other day, and there appeared to me to be a little discrepancy in my account —some five dollars. The banker said he knew it was all right; I thought otherwise, but I was only guessing. He proved it to me with his little lead pencil, and I had to admit it. We would do better in this world if we kept some account of the principles that underlie crop growth. We must get out of our ruts, and be leaders instead of being led. If we are led by others we are apt to hold back, even if the leading is for our best interests. The man who finds out best ways and practices then becomes a leader. Use the best and cheapest foods for your dairy cows. Only the rich can afford to feed hay in large quantitities. As for turnips, they will taint the milk, and a good windmill will raise water more cheaply than you can get it in the turnips, and the milk will be more satisfactory.

If I have succeeded in dairying beyond ordinary, it has been chiefly because I made a study of the corn plant and utilized it to its best purposes. It has enabled me to give summer conditions to my dairy cattle in winter. Many an hour have I spent on my knees in a corn field, watching how the plant grew, finding what it needed and what it did not need, and seeing if I could raise it better and save it better than my father did. How did my father handle it? He said that all the crop was good for was to yield ears, and so he grew corn for ears. Some of the stalks were flung out occasionally to the cattle, but it had become fibrous and indigestible, and my father and the neighbors declared that corn stalks were no good for cows And so in the old time farm economy, most of the corn stalks were most wastefully fed, and the refuse, two thirds of the whole, was thrown on the manure pile to rot. When that manure was carted out in the spring there was need of a time of fasting and prayer to precede it. Imagine your manure half full of woody corn stalks.

What is a corn plant? It is a lot of sunshine concealed in a fish-pole. (Laughter and applause.) In feeding corn, you are putting sunshine into the cow. The life of that corn plant—its wealth of food—is not dug up from the earth, so much as it is absorbed from the air. In other words, 60 per cent. of the growing corn plant comes from the air—all of its starch and sugar—and not from the soil. A number of you when handling your corn last fall came across a tassel of corn with kernels growing in it. You have also found dozens of "harvest hands," a cluster of poor little immature nubbins. And when your boy asked you why the tassels were so behaving, and how the "harvest hands" came so, you said the corn was going into some fool business. Now, that was the corn plant telling you of its life history. It was trying to inform you that it was once under tropical skies and warmed into vigorous life with tropical heat; that it had fed upon rich food, on the decaying luxuriant plant life that had preceded it; that it was longing for the old conditions, and that unless you fed it with plenty of decaying plant food such as the clover sod, and the green manures, it would not get its natural and best food. Was it not when it had that rich clover sod to feed upon, in that fairly wet, hot summer that you were so busy that you had to neglect it, some cultivated less and shallower, and let the roots have undisturbed growth, that you had the finest yield of corn you ever cut? Corn requires a warmer soil than it usually gets. And how can a man make his soil warmer for the corn? That clover turned under by its fermenting made your soil possibly eight degrees warmer that if the land had been previously plowed two or three times, and so actually moved your corn field 200 miles south. As a tropical plant, corn must *not* be grown in the shade; it must have sunlight and warmth, and this it cannot have in perfection if you will persist in growing four stalks to the hill. Such corn growing can result in a fewer ears, and many nubbins. Some men—I may say most men—have also insisted in cutting off some of the roots repeatedly during the summer in weeding and cleaning, and then they wonder why they do not succeed in raising more sound corn. It was not Providence who kept back that corn from flourishing; it was the corn-killer with a horse hitched to it, and a foolish man governing the machine. (Laughter.) We often blindly charge our failures to an always beneficent Providence, and sometime to the administration, but of course you never do that in Canada. (Laughter.) Always remember that the corn plant is a child of the sun, and that being the case we must give it all the sunshine and natural plant food we can, and give it, instead of the usual custom, less but wiser attention. Do not injure its roots. Instead of planting it in hills, get it in so that you can have each plant grow by itself, so that it can receive all the sunshine possible. Do your cultivating before you put in the corn seed. Make the ground as fine as for a field of wheat before planting. Never put corn in a rough soil, so that you have to wait for a shower to slake the ground before the roots can something to take hold of. The reason corn turns yellow is because it is starving. Have the field well manured with plenty of clover sod; have the soil well pulverized; and then plant on that rich, well cultivated land. For the silo, plant a kernel every six inches, in rows three or four feet apart, and for field plant every fourteen inches, which will give you 14,800 plants. But I am asked here, "How can you cultivate such a field?" When I first planted silo corn I found that something was radically wrong. In some places where I had done but little cultivation I found a splendid yield, with a large number of ears. Where I had cultivated frequently and deeper during the growth of the plant, I found rather the reverse. I studied the matter, and learned something about the habits of the corn plant. If corn is planted as it should be it will send out two sets of roots. One set will grow some distance away from the hill and then turn down, and run as deep as from two to five feet into the soil. The purpose of these roots is to find and bring up water to the plant. We call them the "water boys." The other set of roots run out from the plant just under the surface from four to five, and sometimes even six feet, keeping about two to three inches below the surface. These are the "luncheon boys," who pick up the soil food for the plant; and when you can get the water boys and the luncheon boys to work together, with the leaves also drinking in sunshine and other elements from the air, there will be success; otherwise, failure will be invited to a greater or less extent. If I wanted a perfect corn soil, I would try and get it to register 93 degrees for 100 days. We are too near the Klondike for that. We have only about 74 degrees naturally, but if I can get a good clover sod under, to decay while my corn is growing, that will add about eight degrees to the temperature of the soil, bringing it up to somewhere near 82 degrees. If I cut off these side roots—these luncheon boys—what good is that clover sod going to do my corn plant? If you so arrange things that no man can cultivate your corn land for more than an inch or two deep you are all right. Why do you cultivate corn? Some think it is to make the corn grow better. You never made your corn grow better by deep culture. The best hills of corn I ever saw grown had a blanket put all around the plants, and never any cultivation done to them—just smothered the weeds. But none of us have blankets enough to go over a ten acre field. (Laughter.) Cultivating corn, as ordinarily practised, does not make it any better, but rather worse. The real object of wise cultivation of corn is to kill the weeds, and keep the surface of the soil stirred so as to retain the moisture. Weeds do not do much harm to corn *as weeds* A crop of crimson clover even does not do it much injury, because it does not grow very high. But some weeds not only grow high, but they also take up much water, a great share of the moisture. Weeds are prohibitionists of a sort that are always true to their principles; that is, they take water only, and water all the time. That sort of prohibitionists, unlike the human variety, are very hard on a corn field. (Laughter.) I have a friend who has been calculating how much water a hill of corn will drink up in a season, and he declares that corn attains its best growth where there has been a rainfall of 16 inches in the period of its growth. That is about 1,600 tons of water to the acre. The average rainfall of Ohio in the corn season is about half of that, and I suppose you have nearly the same here. You can readily see that if we allow weeds to rob the corn plant of water, it must suffer from not only thirst, but starvation from lack of fluid to carry plant food to its top end. In cultivating we do not need to cultivate very deep. A man once said to me that it was necessary to cultivate deep and keep the surface of land moist. I asked him, if that were so, to please tell me why men ran the harrow over a race-track after a rain? Was it for the fun of the thing, or to get the track dry for the next event? By a light harrowing or cultivating of the soil you make the surface so fine that it acts like a blanket, and in that way it enables you to retain moisture by preventing evaporation from below. But another man says: "You can't kill weeds by harrowing only an inch deep?" Now, is it not a fact that when you plow or harrow deeply you always bring up some more weed seeds to the surface, and many just near enough to the surface to start again, when they would have remained ungerminated if left alone? With the exception of the milk weed and Canada thistle, few weeds will germinate below an inch and a half of soil. Keep the top, and only the top, of your soil cultivated, and you will kill most of the common and troublesome weeds.

We speak of "scientific farming." What is science? It is just an ordinary selection and arrangement of well ascertained facts. A lawyer has his legal facts and principles well arranged and considered, and you trust him with your law case. A physician has made a well considered study of the human frame, its ailments, and remedies for disease, and you trust him with your health, or life. The clergyman has considered his theological and scriptural facts, and some of you trust him with the guidance of your souls; although sometimes the good man has to urge you strongly to work out some of your own salvation more earnestly. (Laughter). And so the scientific farmer is a man who has been trying to get an orderly arrangement of facts bearing upon the soil, the animals on the farm, and the plant to grow upon the soil to feed these animals in the best and most profitable way; and to have this information so that he may place his hand upon them readily. The corn plant sends some of its roots downward deeply, and away to the sides it sends fine, hair like roots, searching for the rich food from the decaying vegetable matter in the soil. Every time you cut off any of these roots it delays the growth of the plant until nature repairs the injury, and as the life of a corn plant is not far from 100 days at best, three days' delay even may mean soft corn.

You have admirable corn land in Ontario. Plant the seed a little deeper than you generally do, and roll the land. That will not make a crust, for you then take the harrow and stir up the top inch of the soil, and only an inch or so. Do not drag it in the morning; the afternoon is the best time for that work. After harrowing, if the corn has been planted straight along the lines in rows three and a half or four feet apart, keep using a cultivator with fourteen teeth in it. Put a light wooden cross-bar behind this, and that will keep the land smooth after it is stirred up by the teeth of the harrow. When should we cut our corn? When corn is tasseling out the food value of the whole plant is represented by the figure 14; when silking out it is represented by 28; when glazing and denting it is represented by 42. When a little further on still, just ripening out, about four per cent. of that starch is turned to wood, and it has a food value of only about 38 instead of 42. After the glazing period you lose instead of gain by letting your corn ripen too much. Here comes in the question asked me to-day. "Do you consider corn in the silo worth more than corn shocked?" Every farmer here, of course, has a nice lawn in front of his house, and mows it once a week. (Laughter). There is nothing equal to that June grass clippings for milk making; it is almost a perfect food, but if you let it dry, 100 pounds of lawn clippings will weigh only about eleven pounds. Can you recover that original food value by adding water? How much milk will a cow give that is fed upon eleven pounds of lawn clipping hay and spring water? There is only two and a half per cent. of indigestible matter in the corn plant in its mature but succulent stage. In the process of drying out, as in shocking corn, twenty-two per cent. of the sugar and starch is turned into wood, and no machinery, no steaming, no splitting or cutting can rehabilitate that twenty-two per cent. lost of this dried corn plant. No man has yet succeeded in stacking or storing corn fodder in any way that much of its valuable food constituents did not burn up. There is not a man here who knows anything about corn for cattle feeding but will say that one shock of corn fodder on the last day of October was worth three on the first day of March. Why? Because the air has burned up much of that starch and sugar, just as if it had been put into a slow stove—a low process of combustion. Let a stick of wood lie out in the air exposed to the weather, and in a few years it has turned to punk. It has been slowly consuming; and so it is with corn stalks. If you put the corn in a silo, however, the loss, instead of being twenty-two or even twenty-eight per cent., will be at the most only five or twelve per cent. Use the silo if you would preserve your corn in the best condition, and feed corn if you would handle your dairy stock cheaply. Its the cheap, well-used fuel and the rich protein that is to solve the great dairy problem.

The PRESIDENT: At a cheese gathering the other evening I was advocating the silo as the best means of producing milk. A farmer there contended that he could make better milk from corn that he has chopped out of the snow and ice. I corrected that idea, and I think Mr. Gould has satisfied all present that the corn in the silo is in the best place and condition for dairy feeding.

Mr. GOULD: That man's claim reminds me of a fellow over in Pennsylvania who talked the same way about chopping his corn out of its ice-bound winter home, and one of our speakers told the audience that perhaps that would work where they expected the cow to go into the business of giving ice cream straight. (Laughter.)

Mr. FANNING: I would like to ask if silage taints the milk?

Mr. GOULD: After ten years' experience I can say that I have never found it. I can imagine that if a man fed ensilage to his cows immediately before milking it is possible that the milk might absorb some of the smell of the ensilage in the stable while the milk was there exposed to it. Prof. CONN, the eminent dairy bacteriologist, holds that it is impossible for the flavor of the ensilage to enter milk through the food; it would be lost in the process of digestion. Mr. J. W. Francisco, of New Jersey, a man who raises 450 cows on 100 acres, feeds his cows ensilage 365 days in the year, and sells under the health officers' sanction "certified milk" for which he gets twelve and a half cents a quart. This milk is used largely by invalids and children.

Mr. FELL: Will milk take a taint while warm?

Mr. GOULD: Generally speaking it is not very likely. If anything falls into warm milk it will develop an odor. A man told me once that there was some trouble with his milk. It got bitter, and green spots appeared on the cream. I went to his place, and watched closely while they were milking, and I noticed that some mildewed straw was scattered under the cow before milking. Some of that chaffy, dusty straw would attach to the hairs of the cow, and with the movements of the animal and the milker would drop into the milk and so affect it.

The PRESIDENT: I visited a stable the other day, and at once an odor assailed my nostrils to such an extent that I instinctively felt that was no fit place to milk a cow in.

Mr. W. JORDAN: Do you feed ensilage alone?

Mr. GOULD: No; I do not do so, because corn is largely a fuel. The thing that feeds the nerves and helps cows to give the milk is protein—or digestible albuminoids or white of eggs—which material is found in the meals. Bran and gluten meal abound in this, but the latter is two or three times as rich as the bran in protein, and you therefore need to feed less of it. Bran is a splendid feed for a cow, with ensilage.

A MEMBER: Would you feed ensilage to make beef?

Mr. GOULD: When one of our milch cows goes wrong we take off some of the bran, feed her more ensilage and fatten her for the butcher. We put her on ration of about sixty pounds of ensilage and a pound and a half of bran.

Mr. SWITZER: What is the best variety of corn to grow for the silo?

Mr. GOULD: The corn that will grow the biggest and come to maturity. There are a number of varieties that will mature in Canada; much will depend on soil and location.

Mr. ISAAC REID: If the corn has been touched by frost will it be injured for ensilage?

Mr. GOULD: Not as a rule. If you will put it in the silo at once it will not be much hurt. The leaves will dry up when frosted, but if you will put a little water over it and then cut the corn I think you will find very little injury has resulted from the frost. It is largely a loss of leaves, but not of the general feeding value in the stock.

Mr. Reid: We built a silo for the first time this year. In September it had ripened enough to cook, but a frost came before we could cut it. We put a quantity of water on it, and put it in the silo. We found the Yellow Dent the best corn. It was sowed on the first of June and cut in the middle of September. We sowed in rows and not in hills, and every stalk had a big yield of ears. I would like to ask Mr. Gould it he would feed turnips with ensilage?

Mr. Gould: Ensilage will make the turnips much better. We recently fed some frosted corn that is now three years old. It is as good ensilage as we ever fed.

Mr. Tinney: We fed some oat sheaves to one of our cows recently and from 150 pounds of milk we got seven pounds two ounces of butter. We fed ensilage and oat chaff to the same cow, and got 200 pounds from her instead of 150 in the same number of milkings, but the amount of butter was just about the same as before. It would seem as if the ensilage produces a larger supply of milk and a less amount of butter.

Mr. Gould: I think this gentleman has not been getting a perfect raising of cream. Our cows have not only increased from the flow of milk, but they have also gone up in the ratio of butter fat.

Mr. Tinney: We set it in deep pans, and found that we could succeed in doing better than in shallow pans. I would suggest the question here, at what temperature should the room be for setting milk in?

Mr. Gould: In every six gallons of milk I would put in about one gallon of water, so as to bring the temperature of the milk, and I would then set it in a room at about sixty degrees. We put the water in the milk so as to thin it out.

Mr. James Hopkins: Which do you consider the best, to feed twice a day or three times?

Mr. Gould: For years we have fed our cows only twice a day, and put a little hay in the manger as a sort of extra. This year we have taken one of our cows in the 9,000 pound list and have fed her the same as last winter, but we are letting her have all the clover hay she wants, but this cow is giving six pounds less on this ration than on the old scale. I have often asked myself, if I feed my cows at noon why don't I get up at midnight and feed them again? Our cows do best on twice a day feed. It is also a saving in food. I always milk before I feed, for then the cow will stand quieter. I never feed a cow while she is being milked.

Mr. Fell: How do you fill the square silo at the corners without tramping it in?

Mr. Gould: I never tramp. I do it by throwing the silage towards the walls and corners when filling. I have a pyramid in the centre of the entrance of the silo, and all the corn strikes again t this pyramid and goes to the sides and corners.

Mr. Black: What is the reason of the black or fungus on the corn?

Mr. Gould: That is a question for your Government botanists to answer. I know of no remedy but to change the planting ground. I do not think this black fungous growth is poisonous. I know of two cows that had a lot of it for two months, and they did not die, but rather appeared to thrive upon it.

Mr. Beall: In Lindsay there is an average of 134 days between the last spring frost and the first fall frost.

Mr. Gould: I am pleased to hear that. It proves that you are in a comparatively safe corn growing district.

The President: I thoroughly endorse everything said by Mr. Gould in regard to the treatment of the corn plant. Corn land should be perfectly underdrained. We cannot expect to receive more money for our butter or cheese per pound than we got this year, but we can lessen the cost of production.

The Mayor of Lindsay, Mr. Taylor, was then introduced and gave a most cordial welcome to the officers of the Association.

Mr. Palmer: I have noticed in moving about the country, and also since going into business in Toronto, that there is considerable lack of business training among many of our farmers. When you who are now sixty years old were young men it was comparatively easy to make a living. Now the competition is very keen, and more brain has to be put into the business. However, we are better able to impart practical knowledge than could be done forty years ago. The object of these dairy meetings is to so instruct farmers that they may be able to make money more easily than before. I would advise all interested in agriculture to take the papers dealing with that subject. A course at our Agricultural College would also be a good thing, and it is not out of the reach of the average farmer's son. Too many young men not only lack knowledge, but they lack perseverence. Some of our young men fail for lack of capital, some for lack of knowledge and others for want of perseverance. The farmer's son has come to the front in many other lines. Most of our successful men in the cities to-day were farmers' sons. They have worked their way up because they had good constitutions and perseverance. I know hundreds of young men in the cities to-day who will never amount to much because they have have had wealthy parents, and the best that is in them has never been drawn out. We need more practical knowledge in agriculture in order that we may learn the most economical methods of raising fodder, and feeding and handling cows Farmers have so much feed on hand that many do not think it amounts to much if they waste a little. In poultry feeding there is generally enough food wasted to feed nearly as many more fowl. Many hens are so generously fed that they will not lay, or else do very little. In closing he urged young men to study the art of expressing their thoughts in clear and simple style. The young women on the farm should also be more alive to their mental equipment. In some counties they are holding farmers' institutes for women to discuss problems of interest to the sex, and these gatherings have been successful.

CANADIAN FOODS.

By Professor Jas. W. Robertson, Dairy Commissioner, Ottawa, Ont.

I must first convey to you the message entrusted to me by the Minister of Agriculture, who asked me to say to the convention that he regretted very much that the urgency and importance of public duties at Ottawa prevented him from attending this meeting. Then I must express my own gratification at being able again to attend the annual convention of the Butter and Cheese Association for Eastern Ontario. I recognize that the Association is carrying on work of a highly educational character. It is a means through which information is provided for helping the farmers of the Province to realize the largest possible measure of wealth out of its natural resources. It is furnishing instruction and encouragement for the production of Canadian foods of the best quality for British markets. It co-operates with the other agencies, such as the Departments of Agriculture, Agricultural Colleges, and the agricultural press, to bring about the largest possible production of the best quality of food products. About forty-five per cent. of the people of Canada are actively engaged in agriculture, or in other words, in the production of food.

Everbody admits that the sure way to increase the available wealth of the country is to increase the quantity and improve the quality of the farm products. A great deal of wealth may be dug out of gold mines, but no matter how rich these may be, it is altogether improbable that they will be as valuable as the wealth which can be gathered annually through the labor of the farming communities.

Half the struggle of life is a strugle for food, and the struggle does not become any less keen or fierce as civilization advances It takes on more polite forms, which are apparently more pitiless. It is of great importance that the best quality of foods be provided in abundance, as from those come the robust qualities which will enable Anglo-Saxons to maintain their supremacy.

Instead of making a long address, I propose to exhibit a series of charts which will illustrate the potency of good food in sustaining forceful forms of human life, and which will indicate that Canada is the best source of supply for these for the British markets.

The following chart shows the composition of the human body of average weight 148 pounds:

	Pounds.	Percentages.
Water	90.0	60.9
Albuminoids	26.6	17.8
Fats	23.0	15.5
Carbohydrates	.1	.1
Mineral matter	8.3	5.7
	148.0	100.0

Water is the vehicle used oftenest by nature for the carrying of portions of material from one place to another. The albuminoids, sometimes called "protein," "proteids," or "nitrogeous compounds," are those which contain about sixteen per cent. of nitrogen. They get the name "albuminoids" from a typical albuminoid, well known to us as albumen, the main constituent in the white of eggs. Albumen is also a constituent of milk. The albuminoids of foods are the "flesh formers," and while they may be consumed to produce heat in the body, their main function is to nourish and repair the muscles, nerves, skin and other parts of the body which contain nitrogen. A living body needs these compounds to form the muscles, nerves, skin and other parts of the body. In performing the functions of life some portions of albuminoids are worn out from the skin, the muscles and nerves, and are carried off in the sewerage system of the body. We must swallow something to replace what is worn off, else we shall wear out. Therefore we must take in our food a sufficient quantity of albuminoids to maintain the albuminoids of the body undiminished.

Then, in the human body are fats for heating and for lubrication. While the living body is composed of certain compounds, every living organism must consume fuel to maintain the warmth or heat.

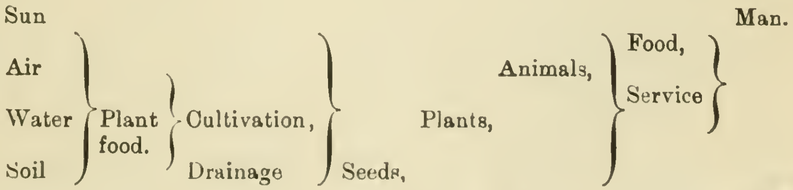
The albuminoids, fats and carbohydrates come from four elements or sources. Albuminoids only of the three contain nitrogen. Four-fifths of the atmosphere everywhere may be termed nitrogen. The albuminoids contain sixteen per cent. of it, and if we can grow any sort of a plant that will glean it from the atmosphere and make it palatable to cows or other live stock, then we may use the nitrogen from the atmosphere, through the plant first, and the cow or other domestic animal afterwards, for the use of man.

There is almost always such an abundance of mineral matter in the common foods which are consumed, that I may pass over it without further remark.

The uses of food may be stated as:

1. To form the fluids and tissues of the body.
2. To repair waste.
3. To be consumed as fuel.
4. To be stored in the body for future consumption.

The sources of all nutrients, or nourishing ingredients in food, are depicted on the following chart:



In fact, the production of food and the whole range of agricultural operations are but the conversion of some natural force from one form into another.

The following chart shows the quantities of nutrients which may be obtained per acre:

QUANTITIES OF NUTRIENTS PER ACRE.

——	Albuminoids.	Carbohydrates.	Fats.
	lbs.	lbs.	lbs.
Indian corn (9,000 pounds dry matter)	873	7,371	288
Horse beans (twelve tons, green)	653	1,814	167
Sunflower heads (seven and a half tons)	352	2,373	729
Hay (mixed, two tons)	271	2,888	97
Roots (carrots or mangels, twenty tons)	480	4,320	68

One object sought to be gained by the feeding of cattle is the elaboration of these crude nutrients into finer forms of food fit for human use. An intelligent man buys milch cows and feeds them on cornstalks; the cow eats cornstalks, and he is able to drink cream. The soil, the plants and the animals are all instruments of conversion; and the objective is an abundance of food and service for mankind.

After providing food for the domestic animals required to elaborate coarse fodders into finer forms, the crops from five acres under a high class of cultivation might sustain five persons in abundance of good food.

As sunshine acts upon the latent life of seeds which are planted, and wakes them up into the doing of something, so the kindly energies of this Association have been waking up the farmers throughout the Province and causing them to bring things to pass. As inert material is quickened and glorified through the contact of the life of the plant and the application of sunshine, so the great masses of the population are awakened up and lifted up by the humanized sunshine which finds expression through such organizations and conventions as this. Of course, some few people see no good in these things. They are those who never go into the sunshine business; and the sufficient answer to their unbelief is that the presence of a blind man does not abolish the beauty of flowers, or prevent the sweet sunshine from enriching the earth with these and many other good things.

Nobody can create anything. A cow can change the form of grass or hay or corn ensilage or grain or roots into milk. A cow can grade up her food into a higher class product. Thus milk contains nearly every material out of which the human body is made, and is therefore an almost perfect food.

Man eats the fine part of the plant direct, and the cow or sheep eats the coarse part to elaborate it into finer forms. The sun winds energy into the plant as I wind energy into my watch. The sun rolls its energy into the leaves, and the stalks hold its strength. These are taken by the cow, and they carry the sunshine which has been rolled into them into the cow, the sun lets go inside and warms the cow. The warmth is the sunshine stored up in plants and afterwards liberated. The wheat plant is saying to us, "Go into the sunshine business; it may be that you have capacity and power for giving back sunshine to the world, more helpful and comforting and more easily transferable than I have in my stalk." Bread and butter are sunshine materialized; when eaten they should become sunshine humanized that it may be a blessing to the world; and if the playing out of sunshine into life does not pay you always in cash, it will pay you in the richer currency of happiness. One hundred pounds of flour will make 136 pounds of bread; and since bread is such an important factor in the happiness and health of the people, instead of a girl being required to play sixteen pieces on the piano before being engaged, she ought to be able to make good, wholesome, dainty bread before any man should be allowed to seek her in marriage. Sometimes the bread appears to weigh about two tons after you have eaten it.

The following chart shows the composition of some common foods:

COMPOSITION OF SOME COMMON FOODS, IN PERCENTAGES.

——	Water.	Albuminoids.	Carbohydrates.	Fat.	Ash.
Oatmeal	10.0	15.0	69.0	5.0	1.0
Rice	12.4	7.4	79.4	.4	.4
Peas	15.0	22.9	57.8	1.8	2.5
Beans	15.1	25.5	55.0	1.6	2.8
Pork, fat	10.0	3.0	....	80.5	6.5
Potatoes	75.5	2.0	21.3	.2	1.0
Beef, rather lean	66.7	23.0	....	9.0	1.3
Milk	87.0	3.5	5.1	3.7	.7
Wheat bread	32.7	8.9	55.5	1.9	1.0
Butter	12.0	1.0	.5	83.5	3.0
Cheese	35.0	25.8	2.3	34.0	3.7

Of the nature and function of albuminoids I have already spoken. They are known as "flesh-formers" in foods. The carbohydrates and fats of foods are termed the "heat-producers." They are the starch, sugar, gums and fibre which are obtained in vegetables, cereals, fruits, etc., and the fat which we obtain in the form of the fat of meat, the butter fat of milk, or the oils from cereals or other plant sources.

CORRECTLY BALANCED FOODS ARE WHOLESOME.

The term "nutritive ratio" is the one used to denote the proportion of albuminoids or flesh-formers in food to the sum of the other nutrients in the food. The heat-producing or fuel value of fat in food is two and a quarter times as great as that of carbohydrates, such as starch and sugar, and also two and a quarter times greater than albuminoids.

That the "flesh-forming" and "heat-producing" parts of our food should be in correct proportion to each other is important for the health and well-being of the race. In the food of the well-nourished peoples of Europe the proportion is about one of the "flesh-forming" to four or six of the "heat producing" constituents. In the diet of Americans the ratio is usually from one to six and a half, or from one to eight or nine. If you compare rice with oatmeal you will find that the difference between these has meant a great deal for the race. If a person uses a well-balanced ration, then, barring accident or disease, he will be a well-conditioned, effective individual.

In our experimental work in the feeding of animals, we find that the vigor, healthfulness and apparent contentment of the animals, as well as their profit-yielding capacity, are in a large measure determined by the proportions which these two classes of nutrients bear to each other, as well as to the palatibility and digestibility of the food which is consumed. I think that the same principle might correctly and beneficially be applied for the guidance of people in purchasing and preparing food for themselves.

THE ECONOMICAL USE OF FOOD.

The proportion of waste in some foods is very great. In beef the inedible or waste portion from bones is from ten to twelve per cent.; in mutton, eighteen per cent.; in eggs, from shell, fourteen per cent.; and in poultry, from forty per cent. upwards Three and a half pounds of potatoes have nourishing material equal to one pound of rice; and there are about equal quantities of nutritive material in one quart of milk, in three-quarters of a pound of beef, and in five ounces of wheat flour or oatmeal. The nourishing value of these three quantities may not be quite equal, as the body is sustained by what is digested, and not by what is swallowed; but, since a quart of milk (costing five cents), three-quarters of a pound of beef (costing ten cents), and five ounces of flour or oatmeal (costing about one cent), contain nearly equal quantities of nutrients, there may be a great deal still to learn on the economical use of foods and the preparation of them in such a way as to make them both palatable and digestible in the largest measure.

I have put on a chart illustrations by lines of different lengths the food value of twenty-five cents' worth of several common foods. The black lines represent calories, indicating the force value or the fuel value of the food. A calorie is a unit designating the amount of heat which would raise the temperature of a pound of water four degrees Fahr. The number of calories which a man needs to sustain him at hard labor is about 3,500 per day. In twenty-five cents worth of beef at fifteen cents per pound the food value is equal to 1,620 calories. The food value of one dozen eggs, at fifteen cents per dozen, is 1,860 calories. The food value of five quarts of milk at five cents a quart is 4,062 calories. The food value of twenty-five cents' worth of cheese at fifteen cents a pound is 3,455 calories, so that a pound of cheese is the equivalent of about two and one-fourth pounds of the best beef you can buy for food purposes. That is why the Englishman's diet of bread and cheese gives him a well-balanced ration at the very lowest cost. That is the reason, you see why, although the cheese market may temporarily pay a low price for it, a large output of cheese is a safe thing in coming years, because it is a cheap food compared with other foods. Men who have to study economy in buying, buy the foods which they like best, and which at the same time contain the largest quantity of nutrient for the price paid for them.

TABLE I.*

Nutritive ingredients contained in 25 cents' worth.	Albuminoids.	Carbohydrates.	Fat.	Calories.
	lbs.	lbs.	lbs.	
Beef, sirloin, 15 cents per lb	.25	....	.27	1,620
Eggs, 15 cents per dozen	.34	....	.29	1,860
Milk, 5 cents per quart	.45	.58	.50	4,062
Cheese, 15 cents per lb	.47	.03	.59	3,455
Butter, 25 cents per lb	.01	....	.85	3,615
Skim milk, 3 cents per quart	.72	1.00	.07	3,495
Oatmeal, 3 cents per lb	1.22	5.70	.59	15,370
Beans, 5 cents per lb	1.16	2.96	.10	8,075
Cornmeal, 3 cents per lb	.77	5.88	.32	13,705
Wheat flour, 3 cents per lb	.91	6.24	.09	13,705
Wheat bread, 5 cents per lb	.44	2.82	.08	6,400
Potatoes, 1 cent per lb	.45	3.80	.02	8,000
Rice, 6 cents per lb	.31	3.31	.02	6,795
Sugar, 5 cents per lb	....	4.89	....	9,100
Standard ration per day for man at moderate work	.28	.90	.30	3,455

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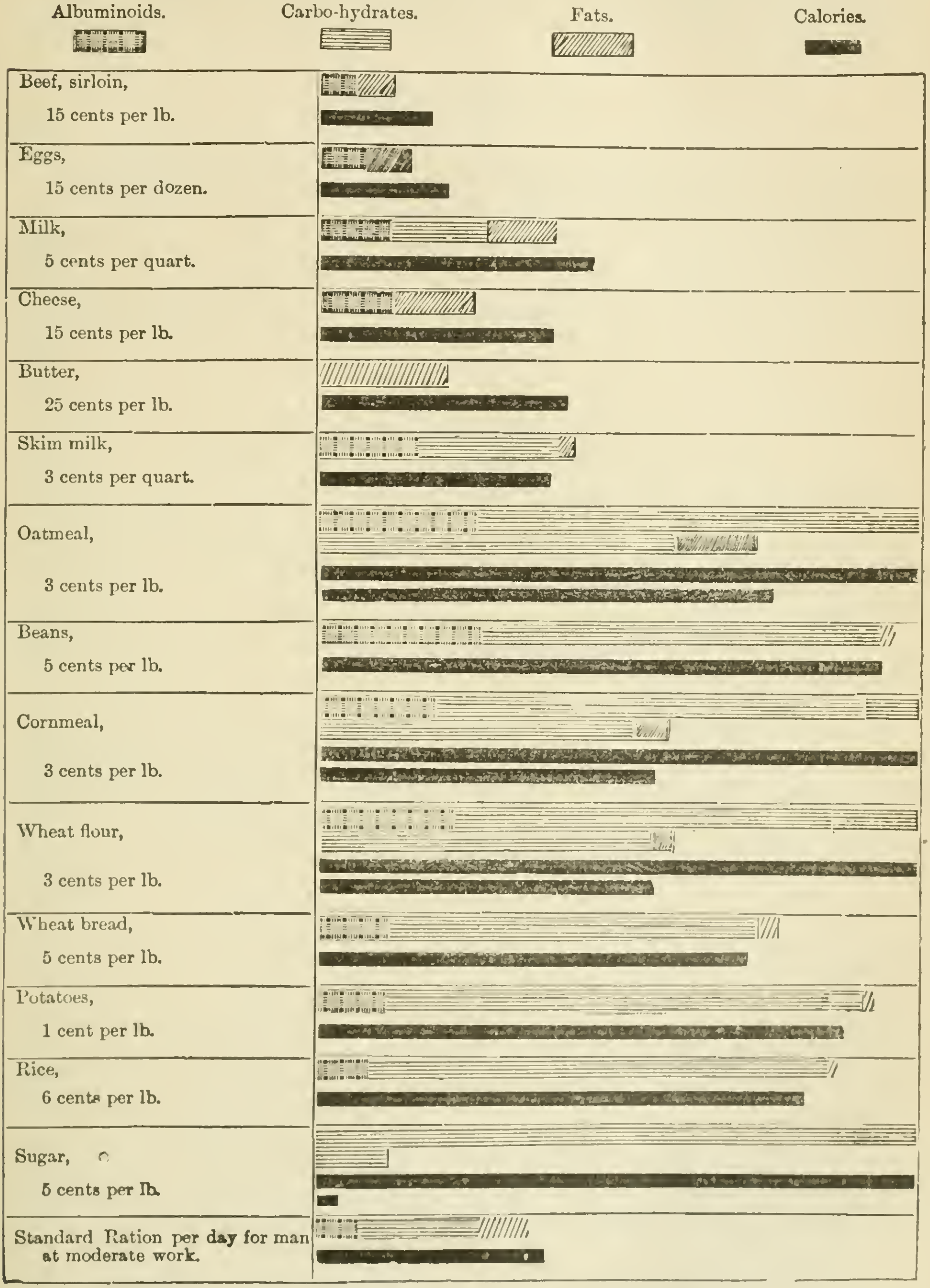
* For some of the information in Tables I. and II., I am indebted to Farmers' Bulletin No. 23, by W O. Atwater, Ph. D., issued by the United States Department of Agriculture, Washington, D.C.

TABLE II.

NUTRITIVE Ingredients contained in twenty-five cents' worth.



I have observed the diets of some of the people of Canada, who cannot afford to buy extravagantly or carelessly, and I find that one can buy for twenty-five cents considerably more of nourishing food than many of these poor people who do not know anything about the nutritive value of foods buy for one dollar. In England, the skilled laborer who earns $500 per year pays about fifty-one per cent. of his earnings for food. In Germany a similar artisan or laborer pays fifty-five per cent. of his earnings for food, and in Massachusetts men in similar stations in life pay out sixty-three per cent. of their earnings for food.

THE WOMAN'S RIGHT.

Woman is and always has been essentially the nourisher of the race. When, through her skill or efforts, the community is well fed, even to its poorer members, it is thus made strong to stand all the strain of our modern life upon it.

Amid the clamor of the new-fangled call for new chances for the New Woman one can still hear the unspoken cry of half-nourished bodies asking for better equipment on the part of the women in the discharge of the duty laid upon them in our form of civilization. This is a much harder class of work to do than those occupations which are termed fashionable and genteel; but, because it is hard to do, it is best worth doing well. It is as much harder to do, as it is harder and nobler to serve well than to shine well; and while the claims of social life, intellectual activities, financial management, domestic duties and artistic tastes become increasingly great, it is unpardonable that the hand of the nourisher of tho people should become careless at that task. When boys and girls are grown in well-nourished bodies, the highest possibility will be realized in passing the torch of life on from generation to generation with a clearer, more kindly, unselfish light and life, exalted a little every time by the hallowed nobility of self-sacrifice and intelligent service. "Whosoever will be great shall be your servant, and whosoever of you will be chiefest shall be servant of all." That is how those silent, strong and constant forces can be made to act for good and not for ill.

In the light of history the advancement of nations is often in inverse ratio to the possession of adventitious resources, and while in Canada there is a very great increase in material wealth and in the availability of means for acquiring it, there is more danger of temptation to lose the ideals of useful nationality.

Under conditions like ours, it is still true that most men and women must labor and should labor. The rich man is no more absolved by his wealth from personal activity and effort than is the poor man by his lack of material embarrassments. Wealth stands for accumulated power, and hence a wealthy man with personal endowment, who also can control wealth, is under double obligation to accomplish more in life than a poor man who is responsible for his perfonal power alone. Simplicity of life makes for nobility in life.

Let us have more plain and wholesome diet for the boys and girls of Canada, and depend upon it that will not lead only towards more perfect health, but also towards more beautiful living, and more earnest and more effective labor.

We shall thus be making the most of the resources of Canada as well as doing our best for maintaining its institutions. We shall thus also do our part in contributing to the stability, progress and prosperity of the empire of which we form a part. Few of us recognize the tremendous importance and value of what we have inherited as subjects of the British Empire. The most notable trait of the British character, in private life and in public affairs, is a love of fair play,—the standing out for fairness. "British fair play" has become a world-wide phrase which stands for even more than legal justice. It is the sense of honor which is the finer part of justice, not quite determinable by ordinary scales of legal or logical measuring. It is that spirit of fairness which has made the progress of our empire to be as the path of the just, "which shineth more and more unto the perfect day."

In Canada we are fortunate in having a composite population, even more composite than the race on the British Isles. We have citizens of French origin, whose artistic sense and taste, whose optimism and love of gaiety, contribute a great deal to our national character. We have citizens of Irish decent, whose oratorical gifts are of a high order, and whose warmheartedness welds neighbors into friends. Then we have Germans, who keep in evidence their musical faculties and powers, and also the prosaic plodding frugality which maketh rich. We have the English, with their indomitable energy, which has made them paint red (on their maps) a large part of the surface of the globe, and given them control of a large share of the business in all other lands. Besides, we have a sprinkling everywhere of those of Scottish birth or descent ; and as the other good citizens of Canada have left them little else of a definite and exclusive nature to do, they have to be content with "bossing" a good many of the jobs. Out of and by reason of such composite race union there is mighty national strength.

In our Dominion, from Prince Edward to British Columbia, we have the possibility of a great future in the way of comfort and happiness for a well-to-do population ; and while thinking none the less of our own particular locality, it will be well to often let ourselves forget our township, our town, our country, our Province, and even our Dominion, in a larger pride and concern for the well-being of the empire. With that outlook, let each do his best in his own field of labor, and thus, while each makes the most of himself, the best interests of the empire of humanity will be served.

SCIENCE AND PRACTICE IN DAIRYING.

By Prof. H. H. Dean, Ontario Agricultural College, Guelph, Ont.

In the short time I have at my disposal I would like to speak to you about how the dairy scientist may help the practical dairyman. I have observed that the average man and woman often makes use of the expression : "I have no use for scientists." I once heard an M.P.P. say to an agricultural audience that he had no use for professors—that they were of no use on the farm. He went on to say that all advances in farming had been made by practical men, and that the scientist had nothing to do with it. Of course there are some men and women who are so purely scientific and theoretical that they can make no success of farming, or, indeed of anything else. Science and practice must go together; divorce these, and you will depopulate the world just as if you divorced men and women. The world cannot support the people who are living upon it without the application of science. Wherever you find the greatest progress, there the scientific man and the practical man joins hands. The speaker I have already referred to said : "Look at mining. The practical man has done it all there ; the scientific man has had nothing to do with it." A year or two ago some men near Sudbury found what they said was anthracite coal. They boomed the find, and many "practical" men were going to invest in the mine. But the Government sent up a scientist—a professor—and he declared that it was not coal, and that it could not be used successfully as fuel. Where is that coal mining boom to-day ? Who is using that coal, so-called, to-day ?

To-day the practical fruit-grower is dismayed at the number of insects and fungous enemies assailing his orchard and garden. To whom is he looking for relief, but to the scientist. The agricultural chemist with his sprayings of insecticides and fungicides is helping the fruit grower to save his trees and bushes from destruction. Our great orchardists do no despise scientists.

In a recent test a cow gave eighty-five pounds of milk in a day. How was this accomplished ? By practice and science going together in the selection and breeding of the animal and her parents. She was not an accident. That M.P.P. also claimed that all the advantages enjoyed by the cheese and butter industry has been the result of the work and planning of practical men and not of scientists. I hold that scientific men and practical men have combined to give this great industry a forward movement. Prof. Robertson is one of several men who have used their scientific knowledge in a practical way to advance the cheese and butter business. The cheese maker of the day is greatly benefitted by the discoveries and inventions of scientific men. My father used to buy cheap butter and grease his cheese to keep them from spoiling. Prof. Arnold was brought from the States to show our dairymen how to improve in cheese making, and it soon was not necessary to buy butter to grease the cheese. More scientific methods were put into practice, and so the business continued to make progress.

Last Saturday night a neat, tidy little woman came into our dairy room and said: "I have a sample of butter here I would like you to examine. I have been supplying Mr. Anderson, the grocer, for four or five years, but now it has gone off flavor. I do not blame him for not taking it, for I would not eat it myself. What is the matter with it?" I examined the sample carefully. The butter was well made, but it was bad in flavor. She left me a sample of the cream, and it was sweet; but when I came to ripen it, I found it had developed that bad flavor. I found the probable source of the difficulty. Certain ferments had got into the cream in the first place, and so the thing was being propagated by the starter taken from the cream. We gave her some of our good starter to put into the cream, and I think she will have a good sample of butter after this. You know how it was with your mother's yeast. Good yeast made good bread, and if the yeast ran out or got deteriorated your mother sent you to a reliable friend for a good setting of her yeast, and so kept up the quality of her own stock. We gave that cream starter to that little woman last week on the same principle.

There are thousands of persons in this country who are trying to make butter "come." They are dashing away at the churn by the hour. When the women get tired they get their husbands to put an apron on and give a hand. The fault generally is that the cream is too cold. The fat globules are very small—such tiny little things—and the cold temperature will not permit them to come together. Get your cream warmer; bring your particles nearer together by having the cream thicker, and you will soon get your butter to come. If you have trouble with the milk from a herd, churn each cow's milk alone. In that way you will soon locate the cause, and so will have a chance to correct it.

Grass is the natural food of the cow. When the cow is upon grass you have very little trouble in getting good butter. The feeding of corn ensilage to cows will also help the butter to come sooner. As to turnipy butter, it is impossible to feed turnips to cows without tainting the milk, unless the greatest pains are taken to overcome the flavor. By heating the cream to 160 degrees, and leaving it for twenty minutes, we can to a considerable extent overcome the bad flavor that comes from feeding turnips. We could never get our butter sold at a high price at the Dairy School—for we have to go outside for our milk—until we killed the turnip flavor in that way. We had complaints in past years about our butter having a turnipy flavor, but we had to take the milk as it came. To-day, by this heating or pasteurizing we overcome the bad odor to such an extent that the dealers in Toronto have told me that they can sell all we can produce, and it is now first-class in every way. If the milk is heated the flavor will also be driven off almost completely. In heating the cream for this purpose it is well to remember that it is necessary to allow it to cool again. It should be allowed to stand for some hours before it is made into butter. Notwithstanding what I have said about getting rid of this taint or flavor of turnips, I think it would be well for the dairy business if we could stop the use of turnips in feeding milch cows. But it will be hard to enforce such a rule while we have so many Scotchmen in Canada.

This year our experiments have gone to show that the fresh milking cows have given the best flavor to the butter, although last year very little difference was observed in this respect. This emphasizes the fact that it is unwise to build too much on any simple experiment. The longer I am engaged in dairy experimental work, the less I am inclined to lay down hard and fast rules as deduced from one or two experiments. I am afraid that some of our brethren in certain experiment stations are building up elaborate conclusions on too few or too limited experiments.

When attending a dairy meeting last summer in a cream gathering creamery, I learned that some of the people were in the habit of straining their milk through broken ice before setting. I made an experiment at Guelph, straining off a certain quantity of milk through broken ice and the remainder without ice. We found that there was practically no difference in the results. As the result of pasteurizing cream we could get a mild flavored butter, which has good keeping quality. I have noticed in judging butter at fairs that the article which takes first prize frequently goes off in flavor when left in a warm room for a few days. Pasteurized butter may not give us that bouquet flavor, but it will give us that firm condition that will keep better, and so it will be more suited to the British market. The best temperature for ripening cream is at about sixty to sixty-five degrees. We have found that using about ten per cent. of starter gives the best results in flavor. We have also found that where we washed butter, and did not wash it, sometimes the washed butter was the better, and sometimes the unwashed butter was the better. We sent some washed and unwashed butter to a Toronto firm, and in that case the unwashed butter was preferred, and it also kept the longer. Sometimes, however, we found it otherwise. We cannot lay down a hard and fast rule in this connection.

In the matter of the proportion of moisture in butter we sent samples of our butter to our chemist, and found that it contained but 11 per cent., while the Danish butter contains from 12 to 18 per cent. of moisture. This being the case, our butter should have the preference in the British market if the flavor is all right. A few years ago the English people were talking of branding butter as adulterated if containing above 16 per cent. of moisture. Let our butter makers keep it below 12 per cent. The water in the cheese is different to that in the butter. The most of the water in the butter comes from a well or spring, while the water in the cheese is natural water, so to speak. It has come in the milk, and is therefore more healthful than that in the butter. Of course some extremely scientific gentlemen may laugh at this theory, but I hold that the two moistures are of a different class.

I have had to throw out merely a few suggestions, owing to the short time at my disposal this evening. To-morrow I hope to be able to give fuller treatment to some of the points touched upon.

THE CURING OF CHEESE.

By J. A. Ruddick, Superintendent Kingston Dairy School.

The changes which take place in a Cheddar cheese from the time its manufacture is first begun until it is in its best condition for food offer a very interesting field for study, not only to the scientific investigator, but to the practical cheese-maker as well. Much time and labor have been spent on the subject with a view to determine the exact nature of the process which changes the tough elastic curd into the soft plastic condition of a well ripened cheese, and yet our limited knowledge of it proves how difficult and intricate the problem is.

A popular theory has been that the rennet was the active agent in ripening cheese, probably because it has been noticed that when a large quantity of rennet is used the cheese will cure more quickly than if a smaller quantity is used Generally speaking this is true, but it is not necessarily so. The explanation lies in the fact that when the large quantity of rennet has been added to the milk, the curd formed is firmer and tougher, is not broken so fine in the handling and stirring, and as a consequence retains more moisture, and it is the moisture which makes the difference by making the conditions more favorable for the real agent or agents to accomplish their work.

The majority of scientific men have held that the ripening changes are due to the action of a certain class of bacteria. Fleischmann says: "That the ripening of cheese is connected with and influenced by micro-organisms, and is successful or the reverse, according to the nature of the organisms that are present in predominating amount, is beyond doubt. Since it has been proved that the organisms which are present in the cheese from the first are largely developed during the ripening period, and since the ripening will not take place when certain substances which are fatal to germ life are introduced, although these may not have any influence on the albuminoids of milk, or when fresh cheese is protected from the action of air, it follows that it is the low micro-organisms which effect the ripening in all cheese."

Just lately a statement has been published by Dr. Babcock and Prof. Russell of Wisconsin, wherein they set up an entirely new theory in this connection. I give it to you in the Doctor's own words, "Recent investigations at this station, conducted by Dr. H. L. Russell and the writer, show that there are in milk certain soluble ferments (enzymes) which have the power of not only coagulating casein, after the manner of rennet, but also of converting the insoluble proteids of the milk into soluble products similar to the peptones formed in gastric digestion. Hitherto the presence of these enzymes has not been recognized. It is our belief that the discovery of these ferments will not only throw light upon many problems relating to milk, but is of great importance in explaining the changes that occur in cheese. These enzymes are inherent in the milk itself and not dependent upon micro-organisms, although it is well known that such organisms do often produce in milk ferments of this nature. It has been shown that these enzymes of milk are sufficient, even when the development of bacteria is entirely suppressed, to convert nearly all the casein into soluble proteids. This change is similar in all respects to that which occurs during the ripening of cheese, and it seems probable that the enzymes of milk are a most important factor in transforming the firm elastic curd of a green cheese into the soft and buttery texture of a well ripened cheese."

Which of these theories are correct, time will probably tell, and meantime there are other aspects of the curing of cheese which are perhaps of more importance to the cheese-maker, because more under his control.

It seems to me that the development of flavor is quite separate from the ripening proces , and not dependent upon it as we are in the habit of thinking. Whatever doubt there may be as to the active agents in the ripening process, there can be no doubt about the flavor being due to the action of bacteria. That is a matter which is very easily demonstrated. Of course when I speak of flavor I mean to include all kinds of flavors, both good and bad. All cheese contain the germs, which, if allowed to develop, will produce many different flavors or taints. In some cheese the filth organisms predominate to such an extent that in spite of everything there will be bad flavored cheese. Very often, however, the conditions under which the cheese are cured will affect the flavor according to which particular class of germs is favored by these conditions.

A high temperature favors the development of the filth organisms which give rise to bad flavor, as Dr. Connell has shown you, while the lower temperature favors the desirable class.

Then there is the matter of shrinkage, which is an important item, and one to which the cheese-maker should give his careful attention, in order that the cheese may be cured with the minimum loss in weight consistent with proper treatment in other respects. In this connection I wish to refer to some experiments which we carried on at the Kingston Dairy School during the past summer.

Owing to additions and alterations being made to the school buildings, we had only a limited time at our disposal for this kind of work, so that the experiments are not so complete as I hope to make them before another winter. A start was made, however, and I am able to report on one or two points.

Green cheese were taken from the press and after being carefully weighed, one of each lot was placed in a room where the temperature varied according to the weather, as it does in a poor curing room, and arranged from 62° F. to 87° F., averaging 75°. Another cheese from each lot was placed in a room where the temperature was in some measure controlled, varying only from 60° F. to 70° and averaging 64.2° F. This gives a difference of 10° in the temperature under which the two lots were cured. As each lot was three weeks old they were weighed again. In striking an average I have grouped together six lots and the shrinkage was as follows: Those cured at the highest temperature lost 4.26 per cent. in weight, while the other lot lost only 2.92 per cent., making a difference in favor of the lower temperature of 1.34 per cent. This would amount to a fraction over one pound on seventy-five pound cheese. Individually there was a much greater difference in some cases, while in others it was less. Further experiment is necessary to show why one cheese should shrink more than another. But there is still another side to the question.

In order to secure an unbiased judgment on the comparative quality and commercial value of the two lots, I submitted samples to experts at the Brockville and Kingston Cheese Boards. None of the men who examined the cheese knew anything about the nature of the experiment until after they had pronounced judgment, and at both places it was unaminously agreed that there was a commercial difference of fully one-half cent per pound in the value of the two lots, giving the preference, of course, to those cured at the lower temperature.

The difference was mainly in the flavor, but the high temperature also gave the cheese a somewhat "mealy" character.

In a factory with 300 cheese on hand at a time, this extra loss of weight would amount to 900 pounds of cheese in nine weeks, which is about the duration of the heated term. At eight cents per pound this would amount to $72, in one season. Then if we consider the difference of half a cent per pound in value on the same basis it amounts to $387.00 making a total of $459.00.

Now I believe it would be quite possible to effect this saving in a large majority of the factories by improved construction of the curing-rooms so that the temperature could be better controlled, to say nothing of employing artificial means of lowering the temperature. I do not pretend to say that a temperature ranging from sixty to seventy degrees is the best for curing cheese. That point has never been clearly demonstrated as far as I am aware. It is just possible that different cheese will require different temperatures for best results. And, furthermore, I think we shall find that the best or most suitable temperatures shall be confined within narrower limits than a variation of ten degrees.

Dr. Connell has shown you how certain specific bacteria will flourish best at stated temperatures which admit of only slight variations. Therefore if the flavor of cheese is due to these organisms it must follow that its proper development is confined to the same narrow limits.

There is still another side to this question, for we have not yet considered the matter of moisture in the air of the curing-room and its relation to the shrinkage of cheese, or even its proper ripening. Moisture dries out of cheese just the same as it does out of wood. The drier the air is in which a piece of green wood is placed the more rapidly does it lose the water which it contains ; so it is with the cheese.

It is obvious that if we allow the air to become too dry in a curing-room we have an unnecessary loss of weight. The great majority of curing-rooms are much too dry. So dry even that cheese will crack under the bandages at times. In such cases there must be a serious loss. Of course under certain circumstances, such as a new curing-room, when the green lumber will make the room damp, or in a basement where the walls are not wholly impervious to the moisture of the earth, there may be plenty of moisture, even too much, so that the cheese will mould.

When cheese exhibit this tendency to mould, plenty of light should be admitted, and if good ventilation and circulation of air will not check it, treating with formalin will effectually destroy it or prevent its growth. We tried this last fall at Dr. Connell's suggestion, and found that it did the work completely. We applied it with a small atomizer so that the surface of the cheese was treated to a fine spray of the liquid. A few ounces of formalin will be sufficient for a large number of cheese if used in this way.

The question arises now as to how far it will pay to go in the direction of securing lower temperature. There has been a good deal of talk lately about the use of ice in curing-rooms. It certainly is not much better than a waste of time, labor and money to attempt to control the temperature of the common curing-room, with its very imperfect insulation, in the shape of poorly constructed walls, open floors and ceilings and badly fitted doors and windows, by the use of ice. The first thing to be done is to improve the buildings, and then if it is necessary to use ice it will be more effective and the labor in connection with its use very much improved.

I think many of our factories are moving in the right direction by putting basements under their present buildings. These basements will certainly be cooler and if they are dry enough ought to make first rate curing rooms.

In order to make the walls and ceilings of an ordinary curing room sufficiently air-tight and non-conducting, to make it possible to control temperature to any extent, it will be necessary to line the inside of present walls and ceilings with two ply of building paper, then furring strips two ply of paper on the strips, common matched lumber next, two more thicknesses of paper, and then finish with matched lumber.

This gives us six ply of paper, two ply of lumber and one air space. Then the floor should be covered with two ply of paper strips on top of that, then two more ply of paper with flooring for a finish.

Take a room fifty by thirty-five with ten foot ceiling and the cost of fixing as I have described will be as follows:

Estimated cost of fitting up a curing room fifty by thirty-five feet with a ten foot ceiling:

3450 ft. matched hemlock at..	$14 00	$ 48 30
3450 " pine "..	20 00	69 00
2625 " 1½ pine flooring " .	23 00	60 37
244 furring strips at	03½	8 34
78 rolls straw paper at	35	27 30
3 kegs of nails at	2 25	6 75
Labor at $1.50 per day		51 74
		$271 80

This may seem like an unnecessarily large amount of material, but it will be found difficult to make walls air tight with less. It will be necessary also to put on double doors and windows, and if the doors are fitted with weather strips they will be all the better.

I wish to refer also to the sub-earth duct system of introducing air into curing rooms. This has been tried in various places and found to be very satisfactory.

There are various ways of constructing it. The first thing is to dig a trench from beneath the curing room to a point at least 200 feet distant. To be most effective it should be put down about twelve feet, which is about the limit of solar influence in this country, that is to say at twelve feet below the surface the temperature is about the same the year round and is somewhere about fifty degrees. Various materials have been used for the construction of these ducts.

There is an objection to wood, for it soon decays, and then the air coming through it will have a musty or mouldy smell. It seems to me that the best material would be the common drain tile. It is of a porous nature, and will take up moisture from the earth and give it off again on the inside, thus adding moisture to the current of air passing through, and at the same time the evaporation will lower the temperature.

The duct should have a diameter of about one foot, or of equal capacity if built in any other shape. I do not know that the drain tiles are made as large as that, but it would answer just as well to have a number of them. In some soils it would be necessary to have the trench drained to prevent the water lying in it.

At the outer end of the duct an upright galvanized iron pipe like a chimney is run up about twelve feet. Have a wind cowl on the top so that the opening is always facing the wind, and when the wind blows the air will be forced through the curing-room. If the walls, including doors and windows, are tight and the room provided with proper ventilation the air will be drawn through the duct to replace what is exhausted, even when there is no wind.

As regards the regulating of moisture in the curing-room, I have tried several plans, some of which seem simple enough, yet fail in practical operation. We tried running a perforated water pipe near the ceiling and hanging a cloth over it, but found it impossible to regulate the water supply to prevent it dripping. Another plan tried was to place a galvanized iron trough near the ceiling and fix the cloth with one end in the water and the other hanging over the side. The water is supposed to follow the cloth as oil does a wick in a lamp, and so it will for a few days when it seems to get dirty and slimy and quits working. Apart from the plan of throwing water on the floor, which is not at all an ideal one, I do not know of any better plan than to have large sheets of canvas or similar material which can be saturated with water and then suspended to the ceiling by means of cord and pulleys.

I do not think it would be necessary to have any arrangement of this kind where the sub-earth duct was in operation or in a basement curing-room.

The hygrometers sold by most dairy supply dealers will be found useful as a guide to the proper amount of moisture in a room. They cost about $2.50 each.

In conclusion I may say that I hope to continue these experiments during the coming summer. Our new curing room is divided into three sections each quite independent of the other, so that we will be able to study more fully the effects of different temperatures, and also the effect of different degrees of moisture. I believe the curing of cheese deserves a great deal more attention than it has received in the past. Thousands of dollars are lost annually, much of which might be saved if better methods were employed.

EXPERIMENTS IN CHEESE-MAKING.

By Prof. H. H. Dean, O.A.C., Guelph.

Last night I spoke briefly upon the relation of science and practice to one another and to dairying. I endeavored to show that men of a scientific bent had done something to help practical dairymen to make better milk products, and I referred chiefly to butter. The addresses this morning have been along the line of cheese-making, and I shall also speak about cheese, and how science has helped the maker of cheese to turn out a better class of goods.

We have heard a good deal lately about the aeration of milk for cheese-making purposes. During the past year we made a number of experiments at Guelph to see what effect the aeration of milk had upon the quality of the cheese. I am free to confess that our experiments so far have been somewhat disappointing—that we did not have the results for aeration that we looked for. There was very little difference in the quality of the cheese made from aerated and unaerated milks. Do not go away with the idea, however, that there is no benefit in aerating milk, for this has been the result of only one year's work, and we can come to sound conclusions only by a series of experiments extending over several years. What will apply to one particular set of conditions may not apply to other circumstances. We tried various systems of aeration in this work. Aerators are built upon two principles. In one case the milk is exposed to the air, and in the other the air is forced into the milk. We could not see any advantage in one kind as compared with the other. Where aerators of any kind are used the first condition should be that the air is pure. If the air is not pure do not aerate at all. But it seems to me that if any aerator is to come into general use the one in which the air is pumped in is likely to be most popular. In the case of aerators in which milk is exposed to the air the milk has to be lifted up for pouring ; and human nature is too weak for a man to do any more lifting than he can help. At least, the average man is inclined to be somewhat lazy ; and the mode of aeration that needs the most exertion on the part of the operator is the one that is likely to be least popular. With those aerators in which the air is forced into or through the milk, there is less effort required on the part of the dairyman. On the 26th of July we had some very bad milk. We had half of it aerated, and the other half was not. We found that the milk aerated gave the best cheese, and there was less loss of fat in the drippings and pressings from the cheese made from aerated milk. This was one marked exception to the general results of the experiments. We found in one or two other cases that where we had gassy curds we could get rid of the gas somewhat easier where the milk had been aerated.

We have also found that pasteurizing or heating the milk to 158 degrees changes the character of the milk, and when the rennet is added you do not have the flakey curd you get from ordinary milk ; it is more like sawdust in appearance. We found also that the cheese did not cure like an ordinary cheese. The pasteurizing of the milk causes that peculiar curd that will eventually produce something very similar to a Stilton cheese.

In ripening the milk before adding the rennet we found that the curds remained in the whey for a less time, but we did not salt any sooner. The only advantage was the shorter time the curds remained in the whey. This, however, prevents you from getting what is called "whey-soaked curd." I have yet to be convinced of the fact that rennet has not something to do with the ripening of the cheese. We had the following results from using rennet at the rate of three, six and nine ounces of rennet per 1,000 pounds of milk. We let these cure, and they were judged by Messrs. Ballantyne and McLaren. Mr. McLaren said : "Here is a cheese that will be rotten before the others are ripe," referring to that having nine ounces of rennet. Mr. Ballantyne said : "No, that condition is caused by the extra percentage of moisture." We sent samples of them to the chemical laboratory, and the difference in moisture was not perceptible. I may change my mind, but up to the present time I believe that rennet has something to do with the ripening of cheese. We come here to find out and declare the truth, and not to force or strain any particular theory. Truth always stands, but theories pass away with men. We found there was very little difference in the time from setting to salting, but the quality of the cheese was better where the curds were dipped at one-eighth of an inch of acid as compared with one-quarter to three quarters of an inch, as tested by the hot iron. We do not know exactly what the hot iron test is, although it is the best we have up to the present time. I hope, however, the time is near when we shall have something better than the hot iron test, for it is not very accurate. An eighth of an inch of acid varies a good deal with the eye of the maker. One man's eighth of an inch is as long as another man's quarter of an inch. Where we dipped at one-eighth of an inch we had less loss of fat in the whey. Sometimes the loss of grease on the whey tank is caused by over-ripe milk. It is therefore the patron's duty to see that he supplies the cheese maker with good milk, and it is the maker's duty to see that this made is up in the best condition. The milk should not be delivered at the factory in an over ripe condition. Leaving the curd in the whey too long is another source of loss, and there is also loss in leaving the curd too long before milling. This is particularly the case where you use a mill that tears the curd and lets out the fat. From an hour to an hour and a half is the best time to mill curds after dipping.

We have also made some experiments as to the effects of salting before the curds mellow. If you salt the curds an hour before the usual time I think you will get a better yield of cheese, there will be less loss of butter fat, but the quality will not be so good.

We have also experimented with putting cheese to press at temperatures ranging from sixty-two to ninety-five degrees. The cheese scoring the highest, as tested by experts, was that where the curds were put to press at from eighty to eighty-five degrees. In warm weather, however, we got good results in putting to press at from sixty-two to sixty-five degrees.

A MEMBER : How did you get the temperature that low ?

Prof. DEAN : By selecting cool days. We sometimes took the curd out of doors and exposed it to the air, thus cooling it to sixty-two degrees. Last fall we received a letter from a maker in eastern Ontario who said that he had no end of trouble with his cheese, and was losing a lot on that account. Our bacteriologist made an examination of the samples of discolored cheese and found that the trouble was different to that in the cheese described by Dr. Connell. When our cheese-maker got this cheese he cut up a piece of it and made a "starter," and after making up some cheese from milk containing this "starter," compared it with the sample from the east and also with our own ordinary make. We found that it resembled the former. In getting some facts in regard to the probable cause of the trouble we found that it is the custom of at least one patron of this factory to feed whey to the cows. I do not know why the whey is given; it may be due to a shortage of water, although that would be strange. I think there is a kind of whey flavor in this cheese. Now that is a serious thing, for that factoryman said that he would lose $300 if it could be proved that he was responsible in the making for that bad flavor and discoloration.

I would like to say a few, straight words on the coloring of cheese artificially. I hope the time will soon come when we shall not make colored cheese. I consider the putting of coloring matter into milk for cheese making a dirty practice. It is possible that there may be some connection between the use of coloring matter and this bad cheese I have spoken of.

If you have any trouble with your cheese, send to the Guelph or Kingston dairy schools. We at the Agricultural College are at your command in order to remedy such matters. But you must remember that it takes time to investigate these troubles and trace right up to the source of the difficulty. It is not a matter of days, but of weeks and sometimes of months. But when once the trouble is located, then the remedy may be found and the cure is good for all time.

HINTS ON CURING AND STORE ROOMS.

By Prof. J. W. Robertson, Dairy Commissioner, Ottawa.

It cannot be expected that every subject taken up at a meeting of this nature will be of general interest, although to the practical man no phase of dairy knowledge can be without some value. I must congratulate the Canadian dairymen upon the fact that they are not only making more cheese and butter than ever before, but they are also making both of a better quality, and in doing this they are making themselves more capable men. If a man had come before an Ontario audience ten years ago, and spoken on the subjects on which some of the gentlemen have addressed us this morning, he might as well have used some foreign tongue. But every man here is interested in the scientific questions presented to us to-day. Over in Wisconsin and Ohio they have some progressive and intelligent farmers, but I think that in understanding the general principles underlying the dairy business the people of Canada hold first place.

I wish to speak for a short time on the improvement of the accommodation at cheese factories for the curing of cheese. When the cheese leaves the press room it is not more than half made. From a consumer's point of judging, it has no appreciable flavor; it has not a desirable body, and these are the two things which give it commercial value. The flavor and body of the cheese are largely produced and determined by curing. So while it is important to look at the patron's end of the business, and see that he furnishes good, pure, rich milk, it is also important to look at the maker's end of the business; and in this latter the proper appointments, construction and condition of the curing-room play an important part. One great fault in the average curing room is the difficulty in regulating the temperature. The two contrivances used to enable the maker to control temperature in the making room are a steam boiler and a thermometer. If a cheese-maker has an irregular temperature in the making process, he will have a very irregular and poor lot of cheese. If he puts no stove in the curing room when the weather is cold, and lets the temperature down to fifty degrees, he will get complaints from the dealer of bitter flavor in the cheese and other troubles, and if he lets the temperature go too high, fault will be found with something else. The cheese-maker opens the windows (and sometimes the doors) of the factory during the night and shuts them in the morning. The average building used as a factory is so happily conditioned by the genius of the builder that the closing of the doors and windows does not require all the pure fresh air to remain outside. There is plenty of opportunity for air to enter at any time, day or night, warm or cold. The shutting of windows and doors, however, results in a bad condition of things. It leaves the cheese to be cured in the dark, and that is not wholesome. Let us everywhere let in lots of sunlight.

The curing rooms should be so constructed as to prevent the outside temperature from affecting the inside contents. It should be an insulated room. In this regard, insulation simply means so separating what you wish to insulate that it will not be affected by the temperature of the air without. For this purpose some material must be used that will not permit the heat to penetrate it readily. The butter storage room should be so insulated that the temperature inside will be not more than thirty-four degrees when it is as high as ninety-three degrees in the open air. The curing room should be so insulated that the temperature may be kept at or under sixty-five degrees. It should be lined inside with lumber. A great many use plaster, but the plaster lends itself in a most fantastic way to getting jabbed with holes and breakages that let in the air, bearing heat or cold.

The curing-room should have a floor of two thicknesses of lumber with odorless building paper between. If the walls are not of brick, stone, or concrete, they should be lined inside with two ply of lumber, with two thicknesses of paper between.

An old curing-room of the ordinary open construction might be greatly improved in the following manner: The whole inside should be thoroughly cleaned, by a liberal use of boiling water. It should then be whitewashed with fresh slaked lime. The floor should then be made close. Two thicknesses of building paper over the old floor and a new floor on top will usually be necessary. If the inside walls are of lumber two thicknesses of building paper may be put on; and over them one thickness of matched lumber planed on at least one side. The windows should be made close; and doors and windows should be double. Then the whole inside should be thoroughly whitewashed. These improvements in a curing-room 30 feet by 28 feet would cost probably from $150 to $200 for materials and labour, according to the condition of the room and the prices of lumber, labour, etc., in the locality.

At a factory turning out about 300 large cheese per month, the saving in a single season's work from such a curing-room will be about $450 out of the losses by shrinkage in weight and injured flavour and body in the ordinary curing-room, in which the thermometer registers anywhere from 70 to 90 degrees.

If you have a curing-room thoroughly insulated by having air-tight walls and close fitting windows and doors, filled with cheese, each cheese will then act like a slow-burning stove. There must be some means of cooling the room. A cheap and effective means of cooling a curing-room is to use a sub-earth air duct. This duct or drain may be brought in through the floor of the room in two places. It should be not less than 100 feet long, should be about four feet deep, and have an opening for the passage of air of about eight inches by twelve inches. It may be made of planks or tiles. An upright opening at the far end with a hood to be turned to the wind is an advantage. In summer it will reduce the temperature by ten degrees. But the floor, walls, windows and doors of the building must be reasonably close. This method of introducing air seems to add to the moisture. The average curing-room is too dry. On the other hand, there is a danger in some factories, where the rooms are shut up close, of having too much moisture, which with the darkness, will produce moulds. To overcome a tendency of this sort plenty of whitewash should be used. Curing-rooms should be whitewashed once or twice a year. The floor of the curing-room should also be sprinkled once or twice in the day; certainly in the morning. In India they let the water trickle over their wine bottles, and as the water evaporates the wine is cooled. The evaporation of the water cools the room considerably.

Formerly butter was put in cellars to keep it cool, but with the development of the industry, and the present day demands of the trade, cellars have been found inadequate, and we have a cold storage of a better sort. The cheese-maker cannot now afford to do without an ice-house any more than he can do without a supply of wood for the curing-room. He must endeavor to reduce the heat of summer by the best means at hand in the summer, just as he raises the temperature by fire in the autumn. At most factories fifty tons of ice can be laid in at an average cost of $40. It is easy then to put up an ice rack in the curing-room, and in this way to produce a circulation of air over the ice. Such a rack need not cost over $10. Ice may be put into the rack once a day, or once every two days, and the cooling will go on until the ice is melted. I will be pleased to send blue print plans, etc., for curing-rooms or places for cold storage for butter. This question of cold storage is one that meets us everywhere just now. We need it to keep our products up to the highest excellence of condition. In the British markets this last season I found English and Scotch cheese selling at fully fifty per cent. more than the best Canadian cheese at their side. In Great Britain they have first-class conditions of pasturage and water ; their climate enables them to have midsummer conditions in their curing-rooms equal to our September conditions, and thus their summer cheese are equal to our cool autumn makes. I believe, however, that in Canada we can have our curing-rooms so constructed that we also can get prime quality in our June, July and August cheese. Intelligent perseverance will enable us to go on from victory unto victory.

BACTERIA AND DAIRYING.

By Dr. W. T. Connell, Queen's University, Kingston, Ont.

The subject of Bacteriology in its connection with dairying is now being recognized as one of vast importance, for its principles underlie, in fact are, the fundamental principles of scientific dairy work. Now I will endeavor in what I may say to pick out a few points which I trust may prove of general practical interest to you all. Perhaps one of the first questions which many would ask would be, "What are bacteria ? What have they to do with dairying ?" I will shortly preface my remarks on the latter and more important question by answering shortly the first question. What are bacteria ?

Bacteria are the very lowest forms of plant life, existing as minute bodies visible only by strong magnifying lenses such as are found in compound microscopes. They are visible only to the unaided eye when they aggregate together in minute masses called colonies. We can get some idea of their minuteness when it is stated that several billion of the common bacterium which causes the souring of the milk could be readily placed upon the top of a five cent piece. Each bacterium exists as a single cell element, and each of these cells carry on all the processes which are carried on by higher plants which are made up of multitudes of cells, and where certain cells are set aside to perform certain functions. But in the bacterial cell we have food taken in—incorporated in its substance—certain products thrown off, and we have the cell dividing into other cells, *i. e.*, reproducing its kind ; the same functions which are carried out in variable manners by the higher plants.

We have very many, in fact multitudes of species and varieties of bacteria, just as we have species and varieties of the higher plants. These species are widely distributed through space being found practically everywhere—in earth, air, water, dust, on the surface of our own and animals' bodies, on hairs, and in excreta of all kinds. The species differ from one another in some particular, as form, color of growth, and particularly in methods of growth and action.

These bacteria when placed in favorable surroundings grow and multiply in numbers very rapidly. Such favorable conditions are on a minute scale, those required for the higher plants, *e. g.*, wheat, all require food, moisture, a proper temperature and space.

If these be all present in proportions and quality suitable, a single bacterial cell can multiply to many millions in the course of a few days, and to thousands in a few hours. The various species require different forms of food. I can illustrate this best by taking the species that cause disease in man. Some are so fastidious that they will live only in the human body itself, others may live on other animals as well as man; still others exist in dust, water or milk, finding there suitable nutriment, and from these obtain entry to the body of man. As with these disease forms so with other forms, various substances furnish means of support—earth, water, higher plants excreta. Still others live chiefly on milk and milk products, and these are the ones of importance to us.

Moisture, too, is essential to bacterial growth. Without it growth ceases, so that dryness is one of the means of checking bacterial multiplication. Every one has had experience of this. Damp cellars are usually mouldy ones. Dry ones are free from it. A piece of bread dried out shows no mould. A piece kept moist scums over with a bacterial or a mould growth in the course of a few days.

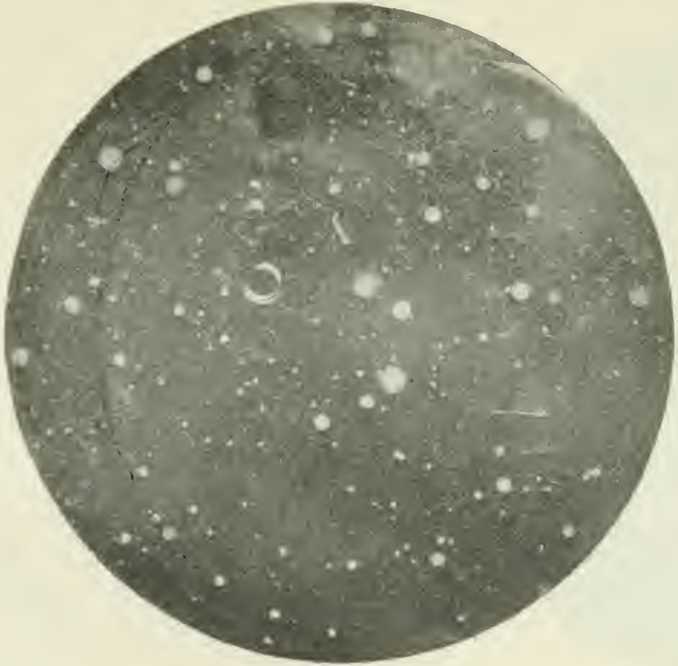
Temperature is a very important factor in the growth of bacteria. The different species vary much in this respect. Nearly all forms have a certain temperature range within which they grow well. Disease producing forms, and forms derived from animal excreta, flourish best at or just below body temperature, 98° F. For many other varieties this is too high a temperature. Most varieties grow best from 68° to 95° F. Many forms grow well in milk down to 60°. Below this growth gradually ceases, till at 45° growth has practically ceased. Bacteria are not killed by cold to any great extent; they are simply held in check for a time—lie dormant. When the temperature raises they can grow again, just as fall wheat is frozen up in winter and under ordinary circumstances starts on growing again at the point where its growth was checked the previous autumn.

Heat has an opposite effect on bacteria—over 100° F. growth gradually begins to cease. As we get over 120° F. the bacteria begin to be killed. Very few microbes can stand a temperature of 155° to 165° F. for longer than twenty minutes. This fact is made use of in the process of pasteurization, which consists in the clearing of bacterial forms from milk by heating to 158° F. for twenty minutes or so. We have found in the Kingston Dairy School that rapidly raising the temperature of milk (in thirty seconds) to 158° F. in the pasteurizing machine, keeping it at this temperature for about two minutes, and then rapidly lowering it over a hundred degrees in thirty seconds, kills nearly all forms of bacterial life; the forms which persist being in all probability spore bearers, and are in our experience very scant in numbers. Plates 1 and 2 show the effects of pasteurization on cream—in destroying the bacterial content of the cream. A temperature of boiling water almost instantly destroys non-spore bearing forms, while if continued for some minutes these will be killed as well. I have mentioned spores. These spores are formed only in some varieties of bacteria, and are special seed forms of these bacteria. They are more resistant to heat and chemical agents than are the bacteria themselves, and when placed in favorable surroundings grow out once more into the true rods again. They are in fact a natural means of preserving a species.

Light has an important influence upon bacteria. As a class they avoid the light of day, flourishing best in the dark. Sunlight kills most species very rapidly; in fact the sun is our great natural germicide. It is an old hygienic saying that "that housewife who daily throws open her rooms to the sun, is a practical sanitarian." We can apply the same principle to the dairy, and say that the dairyman is adding an important adjuvant to cleanliness when he exposes his utensils to the sunlight. The action of sunlight is well illustrated in Plate 3.

Now we come to the question of how do bacteria bring about certain changes in milk and milk products? How do they excite what we call bacterial fermentation? They do so in several ways—partly by breaking up certain of the food elements and incorporating them in their own substance, but mainly by giving off from their bodies during growth, certain products which act upon the food elements, varying with the products formed and the food upon which they are living. Let us take for an instance of the process of

PLATE I.

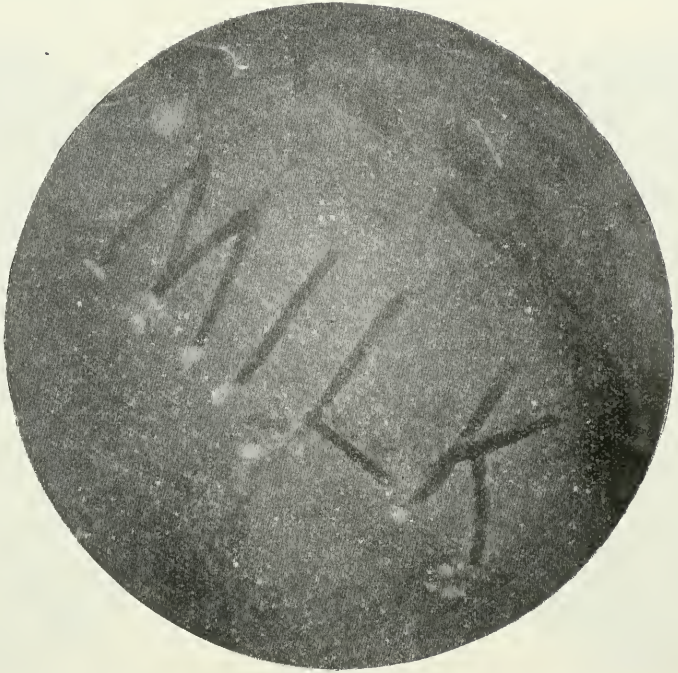


Growth of bacterial colonies from one drop of cream before pasteurization.
(Grown in Agar-Agar for 24 hours at 98° F.) Feb., 1898.
Kingston Dairy School.

PLATE II.

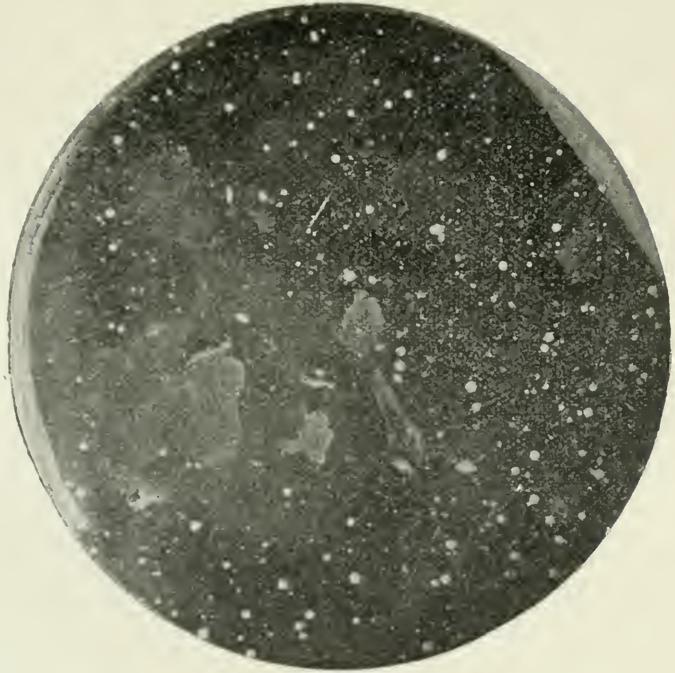
Culture from one drop of cream after pasteurization. No growth.
A contrast plate to No. 1, illustrating the fact that pasteurization destroys the bacterial content of cream.
Kingston Feb., 1898.

PLATE III.



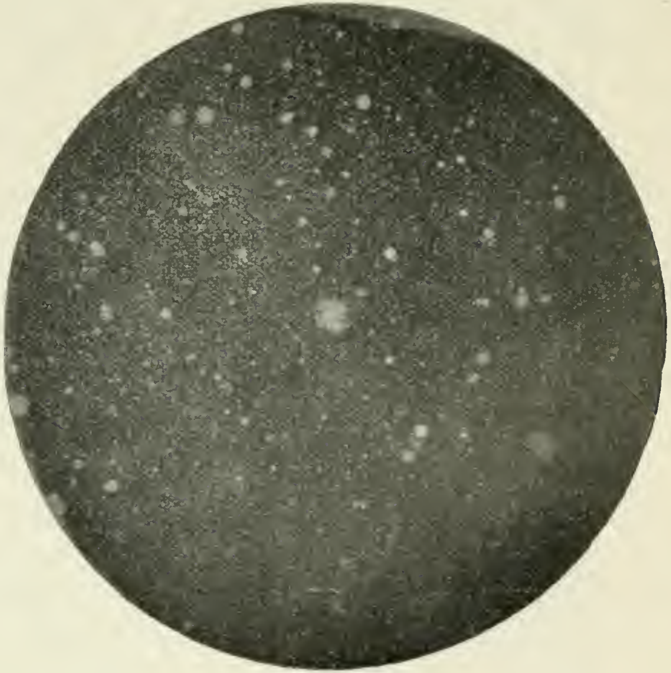
This culture plate was inoculated with the Colon bacillus—covered with cardboard, in which the letters M I L K were cut out, then exposed to direct rays of the sun for 4 hours, and finally incubated at 98° F. for 2 days. Where the sun's rays passed through letter lines the bacilli have been destroyed, while elsewhere growth has occurred. Kingston, Feb., 1898.

PLATE IV.



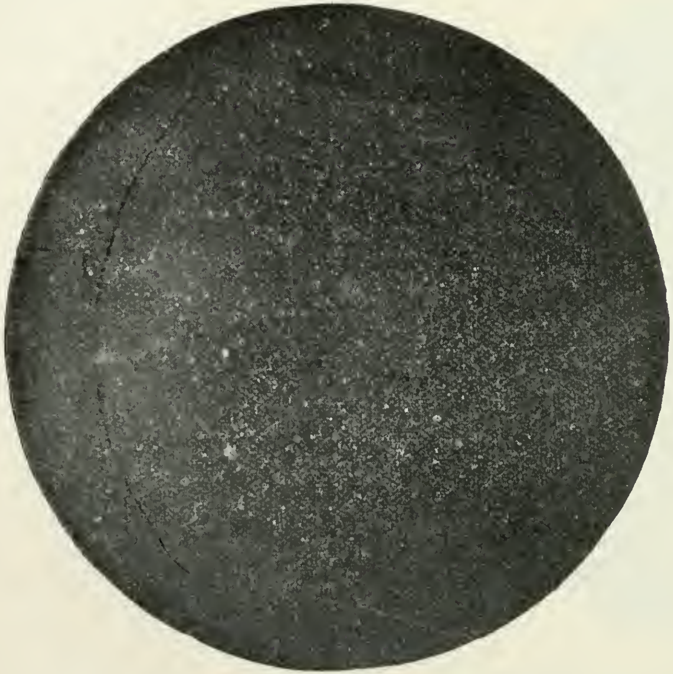
Growth from a minute speck of cow manure. (Agar plate incubated 24 hours at 98° F.) The bacteria present are colonies of B. Coli communis, Proteus bacilli, and some fluorescent bacilli and several colonies of B. subtilis (Hay bacillus).
Kingston, Feb , 1898.

PLATE V.



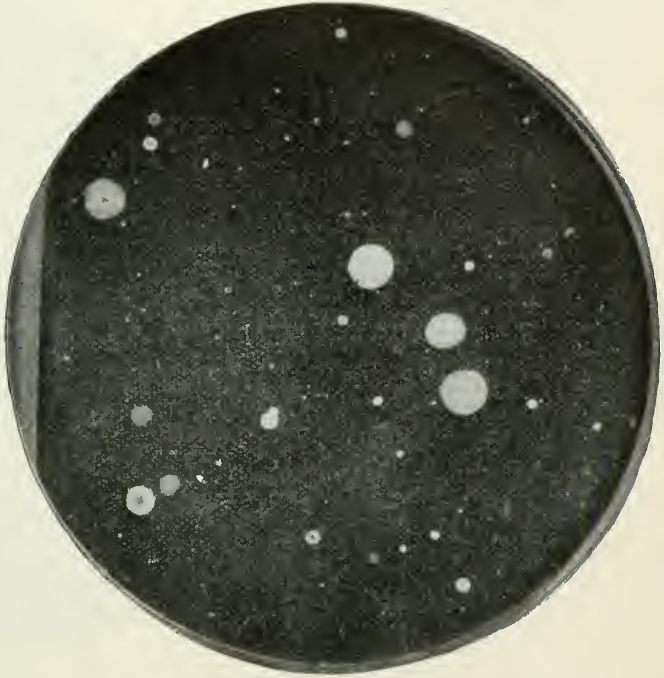
Growth from one drop of milk from Kingston city supply (and as ordinarily furnished the Dairy School.) Colonies are chiefly those of Lactic acid bacilli (small colonies.) Some colonies of B. Coli communis and of B. subtilis are also present.

PLATE VI.



Growth from a minute fragment of a 4 days old cheese. The colonies are almost altogether those of Lactic acid bacteria, but a few (larger) colonies of other bacteria are seen. This culture was incubated at 70° for 2 days.

PLATE VII.



Growth from a minute fragment, same cheese as No. 6, incubated at 95° F. for 2 days. The small colonies are those of the Lactic acid bacteria, the larger are of two kinds, B. Coli communis and Sarcina. This plate shows how markedly high temperatures force the growth of Colon bacilli, etc. when present.

bacterial fermentation the common souring and curdling of milk. This souring is brought about by the lactic acid organisms—chiefly bacilli. They act by breaking up the milk sugar into lactic acid. This acid is what gives the sour taste. Now this acid when formed neutralizes the salts which hold the casein of the milk in solution, and when these salts are neutralized the casein falls as a precipitate—is curdled. While most common fermentations are bacterial in origin, all are not. As an instance of a fermentation which is non-bacterial or unorganized, we have the action of rennet in curdling milk, by acting directly upon the casein.

I have spoken of the general characters of bacteria at some length, as it is essential that we should know the general before we go into the particular applications of the subject to dairy work. Now we come to points more practical to the dairyman. There are classes of bacteria which find in milk and milk products their natural habitat, and which bring about many changes which we are accustomed to look upon as natural, such as acid production, souring, curdling, and the like. But besides this class of changes we will at times find certain others which we do not so look upon as natural (though in reality as natural as the first set), such as bad flavors, bitterness, curdling without souring, coloration of milk or cheese, and such like. The vast majority of such changes are brought about by bacteria, and though usually the souring organisms get in and get the upper hand, yet in the case of the changes which we look on as unnatural we but have some other species getting the upper hand—out-multiplying the others. If we could keep milk free from micro-organisms we could keep it sweet indefinitely. But we cannot obtain such milk in the ordinary process of milking, for bacteria are found in the milk ducts of the udder, on the teats and udder, the sides of the cow, the milker's hands, and in stable dust. It is fortunate that the bacteria which bring about the desirable changes in milk, butter and cheese are very widespread, and are in the great majority of cases able to bring about these changes. The reason of this is patent. They live in milk and milk products, and will naturally be found in greatest numbers near their food. I have been told that in our North-west that when a dairy is started in a new section that the milk often keeps sweet from three days to a week, in weather that would here cause milk to turn inside twenty-four hours. Later on, however, their milk sours just as rapidly as ours, because the bacteria which sour the milk increase vastly in numbers as time goes on. With the great multiplication of dairies and factories over our country this past ten or fifteen years there has been a corresponding increase in the numbers and distribution of the bacteria that live on milk. But has this increase in number of dairies and the vast increase in dairy products, been effected in such a a manner as to solely increase those bacterial ferments which bring about the desirable changes in milk, produce a well flavored butter, and a well cured cheese? I say no; the conditions are not such as to bring about such a state. It has become, if anything, more difficult to produce a uniform grade of butter and cheese. For with the increase of the desirable forms of bacteria there has been an increase of undesirable forms as well. These forms have their opportunities for growth and multiplication in the whey tank and gutters, in the drains, in uncleansed milk cans and milk utensils, on uncleansed floors, and in what we term "filth" everywhere. Can the bacteria which produce the offensive odors which float out from many whey tanks, gutters and drains, produce, if they obtain entry to milk, a well flavored article of butter and cheese? I fail to see how they could. Yet in how many dairies and factories do we see either an offensive whey tank or some other article or material which would replace it in offensiveness. Do we wonder that the dairyman or cheesemaker has trouble, has off flavored milk or cheese? Undesirable bacteria, which are so apt to be found in offensive whey tanks and in uncleansed gutters, may obtain entry to the factory and seed the milk, in two ways, by coming in contact with the dairy utensils, either directly, or in the form of dust by drying up and blowing about; or secondly, by being taken home in the milk cans in the whey or skim milk, and if these are not thoroughly cleansed then those bacteria left behind multiply in the fresh milk placed in the cans. One patron can in this way seed the entire supply. Often both methods are at work. I cannot do better here than give you illustrations of cases in which I believe these factors to have been respectively at work. As an instance of where trouble arose by the vats being seeded from the dairy utensils and dust, I can refer you to a bulletin published by the Dominion Department of Agriculture on the "Discoloration of Cheese" In a factory in Leeds county the cheese were found to show, some ten days after making, very numerous reddish spots. I was asked to look into the matter, and found that the gutters leading from the factory were filled with a slimy reddish growth—a vast culture mass of bacteria. The edges of the growth faded off into the surrounding dust, forming part and parcel of it, to be blown about and into the factory and upon the factory utensils. I found nothing in the milk sent to the factory to account for the coloration, but here in the gutter was cause enough. The factory and gutters were carefully and repeatedly cleansed, with the result that the spots entirely disappeared I should have said that I recovered from the spots in the cheese and the slimy growth in the gutters identical bacilli, and I think proved the gutter to have been the cause of infection.

Now to illustrate infection through the whey tank, I will cite you a case occurring in Glengarry county last summer. Here they had slimy or stringy whey—and Mr. Ruddick was asked to look into the matter. The trouble was intermittent in character, appearing for a few days and then disappearing for a week. Mr Ruddick stated the factory, the drains and gutters to be thoroughly clean, but the whey tank not so well kept. He sent me samples of the cheese, of the slimy whey and of the whey in the storage tank. I found in all, more particularly in the wheys vast numbers of a large bacillus which has since been proved capable of producing both slimy milk and whey. Of course I have not here excluded infection directly from stables, etc., but I think the intermittent character of the trouble is an important factor in believing the whey tank the great factor in keeping the affection active.

Besides these methods of contamination, which may be said to be factory ones, we may have other sources of infection. There is at work in the causation, more particularly of gassy milk, pin-hole and floating curds and many forms of bad flavored and gassy cheese, another source of contamination, and a most marked one in so far as my experience with the milk furnished the Kingston Dairy School the past two years is concerned. This source of infection is by a certain series of micro-organisms always found in the excreta of animals, and hence in stable and road dust, etc. These micro-organisms are known as the Colon group of bacilli. The most common means of contamination is by particles of manure falling directly into the milk pail from the udder or sides of the cow. These particles are often large enough to be visible, as can be readily seen by examining the bottoms of milk cans. One would think that it would be an easy matter to keep readily visible particles out anyway, let alone those small fragments which carry myriads of bacteria. Plates 4 and 5 show the bacterial contents of manure and of winter milk respectively, and in both are seen allied bacterial forms, viz., the Colon bacilli. If the plates here shown are not an argument and reason for careful cleansing of the cow, and particularly of the cow's udder, I cannot think of a better one. Besides this direct means of infection with this group of gas-forming bacteria, stable dust and road dust, both of which are loaded with minute particles of excreta, are sources of contamination. Direct infection plays the most important part in winter-dairying, while dust is the more active agent in the summer months. Now I have time and again proved the relationships between varieties of Colon bacilli and pin-hole and floating curds and many foul-smelling milks. One of the best marked cases I have seen occurred in February last in the Kingston Dairy School. The curd for a few days was very foul, and on examining the milk samples one particularly foul sample was found. This patron's milk was made up separately, and gave a floating foul curd. I readily separated from the milk, the various curds and the cheese a Colon bacillus in vast numbers, and on introducing these into fresh milk we could get a floating curd with the typical odor. Another feature about the cheese made from this patron's milk was that it did not cure.

I have found other organisms than the Colon varieties in cases of bad flavored cheese. In several cases these bacteria belonged to the micro-organisms of putrefaction, the Proteus group; another group of filth bacteria. Mr. Publow last summer sent me some specimens from Montreal of a bad-flavored cheese, from which I separated a bacillus belonging to the putrefactive species. In November Mr. Publow placed some cultures of this bacterium in an experimental vat as a starter, and on examination of the cheese one month later reported the reproduction of the bad flavor typically. Let me say that in all of these experiments control vats were also made.

This leads me to speak of another matter, viz., the effects of the temperature at which curing is carried on upon the bacteria which are in the curd Believing as I do that bacteria are the active agents in the curing of cheese as well as in the production of most flavors, temperature has an important bearing on the flavoring and curing of cheese. The curing of cheese goes on well at temperatures ranging from 60° to 75° F., and indeed very often at higher temperature. But when we have higher temperatures the gas-forming organisms and filth organisms if present in any numbers, can out-multiply the lactic and other groups, thus obtaining the upper hand and preventing proper curing. This certainly happened in the case I have cited as occurring in the Dairy School last winter. In consequence of the higher temperature, and the predominance of the filth organisms, we may find variable conditions, such as gassy cheese, heaving and cracking, foul flavors, softened areas or a poorly cured cheese. High temperature, then, forces the growth of filth organisms to a greater extent than it does the other bacteria in cheese, and thus they obtain the upper hand in many cases with bad consequences. Cure cheese, therefore, at temperatures below 75° F. anyway. Plates 6 and 7 will illustrate the different temperature has in forcing the growth of bacterial species.

And now as I have taken up a large share of your time I will not speak of any further connection between bacteria and dairying, but I will try to sum up shortly the lessons which I would have you take from my paper to-day. I have shown you the relationships which may exist between foul and filthy factory surroundings and the making of improper cheese, and have pointed out the means by which such bad cheese originate in such cases. I would lay special emphasis on foul whey vats as being at the bottom of many cases. Further, I have pointed out to you that in many cases the trouble arises by infection of the milk directly or indirectly, by excreta dust and the like, all of which we can class as filth. There is no reason to extend examples further Throughout, all tend toward one conclusion, and that is keep out undesirable forms of bacteria. These forms are found particularly under filthy or uncleanly conditions, so that to keep them out we must make use of cleanliness, and by that we mean cleanliness in every particular. A chain is no stronger than its weakest link. So, too, in the dairy: if we keep things clean in the milk-room or factory and not in the stable we must not expect always good results. We must have cleanliness throughout. I believe, then, in so far as improper fermentation in milk and milk products are concerned, our most important means of prevention and of cure is absolute cleanliness from the cow and stable, till the product is placed upon the table for consumption.

Prof. ROBERTSON: I wish to express my appreciation of the excellent paper read by Dr. Connell, which, in my opinion, is a capital popular presentation of the matter. This year we have been doing a good deal of educational work in Quebec. We have had photographs of these bacteria prepared on magic lantern slides. The pictures are thus greatly enlarged, and everyone can see them easily. This suggestion is worth adopting in Ontario. Dr. Connell has done splendid special work for us in tracing the cause of discolored cheese, and I am free to say that this was one of the best bits of original investigation in the dairy department done for some time. (Applause.) This, mark you, has been done by a man who is called a "scientist;" he has been a great helper of the practical man who has had that bad cheese to deal with. In three months he found the cause, and also found the remedy, and that remedy is good for the next five thousand years. I wish to confirm what Dr. Connell has said, that as dairying goes on it will be more difficult to make good cheese and butter. In the North-West at first the milk will remain sweet for a longer period than it does here, but as time goes on there is not much difference in this respect.

BUTTER MAKING.

By M. Sprague, Ameliasburg, Ont.

In discussing the above subject, we will begin with the taking in of milk at the creamery, or as the schoolboy wrote in his composition, "begin at the beginning." When a butter-maker accepts milk at the creamery, the responsibility of making a first-class article of butter then rests entirely with himself, whether the milk be of a fine flavor, or possessed of all the objectionable taints and flavors known. Butter making requires one who is able to detect these imperfections readily, and if possible their causes also, and to take at once such means as the case requires to remove them. In some cases it may be advisable to return the milk, under which circumstances the maker should go in person, or write the patron expressing his ideas as definitely as possible as to the cause of the offensive qualities of milk returned, and the best means to remedy or remove them; or otherwise be manful enough to receive with good grace the criticisms of the buyers or consumers.

In preparing milk to be separated, two very important points should be observed: 1st. That the temperature be high enough to secure a perfect separation, from 85 to 90 degrees for summer and not below 95 degrees for winter. If the cream is to be pasteurized, which is very desirable for winter butter making, the temperature of milk may be raised to 125 or 130 degrees with satisfactory results, both in exhaustive skimming and in increased capacity of separator. 2nd. Milk is heated before being separated, in order to decrease the density and increase the difference in specific gravity between the fat and other parts of the milk. Heat destroys cohesion and expands the particles, causing them to occupy greater space. Butter fat is not as good a conductor of heat and cold as the serum or other parts of milk; consequently does not expand so readily, and sufficient time should intervene after the proper time has been reached for this expansion to take place before the milk is fed into the separator. To get the double benefit from heating three to four minutes is considered sufficient. It is not advisable to heat all the milk in creameries receiving large quantities, for fear of souring before it can be separated; hence a heater or tempering vat large enough to hold sufficient milk to employ the separator four or five minutes is preferred to instantaneous heaters or live steam turned into the milk as it passes to the separator.

The separator requires careful attention, supplied with good oil and thoroughly cleaned with warm or tepid water each day after using; great care being used to remove all deposits of sediment from the skim milk tubes; then scald with steam or hot water and allow to dry, when the various parts can be put together for next day. Butter-makers should aim to make the separator skim to less than one-tenth of one per cent., samples being caught at intervals during the skimming and tested each day with the Babcock test. Speed must be regular and up to what the particular make of separator may require in order to acquire the best results. The number of revolutions the bowl should make is always stamped in the top rims of the bowl, and it is unwise to run the separator much faster owing to the danger of bursting or straining the bowl.

Have the separator regulated so that the cream will be the required thickness; from 27 to 35 per cent. butter fat will give best results for butter making. Always use a starter in ripening the cream made from pure flavored skim milk, which should be pasteurized after having about twenty per cent. pure water added to it. Keep the temperature to 160 degrees for about twenty minutes, then cool to 90 degrees and have from three to ten per cent. of the previous day's starter (providing it is of good flavor) added as a culture. This process followed from day to day, with proper care and scalding of starter can, will insure a suitable starter.

Ripening of the cream is, in my mind, the key to successful buttermaking, and any lack of care at this stage will manifest itself in the butter. We have already stated the advisability of pasteurizing cream for winter buttermaking, but as it will probably not be largely adopted during the approaching season, we will deal specially with the method likely to be practiced. As soon as the cream is separated and in cream-vat, with temperature at 85 to 90 degrees, add enough starter to ripen it in from four to five hours. The amount of starter required will be from 5 to 20 per cent, the surroundings, condition of milk, etc, will determine this, as it is difficult to give proper amount to suit all cases, When the cream becomes thickened and glossy, which indicates sufficient development of lactic acid, cool as quickly as possible to 50 or 55 degrees Far., and allow to remain cooled until the following morning, or until the fat becomes solidified by the low temperature. Three hours at least should be allowed, but longer time is preferred, stirring the cream as often as possible in order to keep an even temperature and expose the cream evenly to the atmosphere, providing it is pure and sweet, "which it should be." This method of quick ripening will not give satisfaction when used by a careless buttermaker, or one who is not at hand at the proper time to lower the temperature of the cream and keep it where it should be that the developement of acid may be retarded. It would be better to cool the cream to 65 degrees before adding starter, when the lowering of temperature would be only gradual up to time of churning. When cream is to be kept longer than one day a little less starter may be used and lower temperature maintained.

The temperature of the cream at the time of churning, the amount of cream in the churn, and the condition of the cream as regards ripeness, are the controlling features in thorough churning. It is certainly an easy matter to secure the same temperature each day, and to put the usual amount of cream in churn, but the difficulty is in ascertaining the proper condition of the cream as regards ripeness. This is usually determined by the appearance, taste and smell, which requires, not only years of experience, but natural qualifications as well. The inability (of one who understands) to transmit to others, his knowledge, of how to judge when cream is properly ripened has, to a certain extent, retarded the advancement in buttermaking. The alkaline test, now used in the Dairy School, Guelph, will overcome this, however, if put in general use.

Without this test the proper ripeness would be described as a pleasant acid taste and smell, glossy, with a fine granular appearance. The ripening is caused by minute organisms called bacteria, yeast cells, or germs. These germs decompose the albuminous constituents, and convert the milk sugar into lactic acid; to get just the correct development of lactic acid to obtain the desired flavor, is what is meant by proper ripening. The churn should not be more than half full of cream, at a temperature that will produce the butter in granules, in not less than 30 or more than 50 minutes. From 53 to 58 deg. F. will be found about right for separator cream.

The thickness of the cream will, however, have an influence on the temperature of churning; thick cream requires to be churned at a lower temperature than thinner. Drain off buttermilk, when granules are desired size. Samples of buttermilk should be tested each day, and if more than a trace of butter fat be found, there is too much. The trouble should be located, which will no doubt show that the churn has been too full, or cream under-ripe. Wash the butter in water at a temperature of 56 deg. in winter, and 45 deg. in summer, using as large a quantity of water as there was cream, allowing the churn to revolve rapidly about one-quarter of a minute or 15 revolutions. Draw off the water as quickly as possible to avoid bleaching the butter. If to be salted in the churn colder water should be used in washing, and the butter allowed to drain for 15 minutes, having the churn lids closed to keep the temperature down. Salt and color to suit the particular taste and fancy of the market for which your butter is intended, but be very careful to have both uniform.

The same would apply to package also, although the 56 pounds square box is fast coming into favor, but whether square or round, always line the package with a good quality of parchment paper, which has been first wet in clear cold brine. Pack the butter evenly and close, in order to avoid air spaces appearing on the surface when turned out on the dealer's counter.

The outside of the package also should present a clean, tasty and inviting appearance, that the attention of the various buyers be drawn to them.

THE THEORY AND PRACTICE OF BUTTER-MAKING.

By J. A. Ruddick, Supt. Kingston Dairy School.

The good or bad qualities of a sample of butter are usually divided under the head of flavor, body or grain, color, salting and finish. The comparative values of these qualities is fixed by most judges at forty-five per cent. for flavor, twenty-five for body or grain, fifteen for color, ten for salt and five for finish.

It should be our business then as buttermakers, and caterers for one of the most dainty of foods, to make ourselves thoroughly familiar with the requirements of our markets and the demands of the public taste on the one hand, and to study carefully the conditions which affect these qualities during the process of production and manufacture on the other. Our standards should be fixed not according to our own ideas, but rather in accordance with the ideas of the people who pay the money for our goods, and are thus entitled to first consideration. How many seem to forget this fact, and continue to do things as they think is right, trying to force upon people that which they do not like.

It is not the purpose of this paper to set up any standards, except in a general way, but rather to discuss some of the principles underlying the work of butter-making, and if possible to make clear why certain results follow certain modifications in the process.

If we consider these qualities separately, flavor, being the most important, naturally comes first. The flavor of butter may be either good or bad, desirable or undesirable, but in either case the derivation is much the same. The flavor of butter is derived from three principal sources, viz.—the food eaten by the cow, the period of lactation, and last but not least the action of bacteria, or in other words the fermentations which take place during the ripening of the cream.

That the food has a marked influence on the flavor of butter will hardly be denied by the buttermaker who has tried to make a first-class article from milk tainted with turnips, garlic, leeks, or other strong smelling foods. It is well known, I think, that the herbage of certain sections imparts to the butter a distinct sectional flavor. I have made butter on the dry plains of the west where the "sage brush" grows so plentifully, and could always detect the characteristic odor of that plant in the butter. I am satisfied that we have a good deal to learn yet as to the full value, in this respect, of different kinds of food. We have heretofore confined our attention largely to those foods which exert a bad influence on the quality of the butter, losing sight of the fact that there may be considerable difference even among foods usually classed as good. Then again, some foods are often blamed for giving rise to bad flavors when it might more properly be laid to injudicious feeding or other causes.

I have heard men assert that the flavor of milk, and consequently the butter made from it, was injured by the feeding of corn ensilage. I do not believe that good ensilage properly fed will have any bad effect, but I do believe that milk will absorb the odor of ensilage if exposed to it for any length of time. Right here let me say that a great many people make the mistake of thinking that warm milk will not absorb odors, but it will, in some cases, more readily than cold milk. The feeding of ensilage has been blamed in this way for what is due to carelessness in leaving the milk exposed in the stable, where the air is heavily charged with the smell of the silo. Some foods, first-class if fed in moderation, will, if fed to excess, induce indigestion, which in turn spoils the milk. But this is a feeding question rather than one of butter-making.

That the period of lactation affects the flavor of butter we know, because we find we can make a finer flavored article from cows fresh in milk than we can from those nearly dry, other conditions being the same.

As regards the action of bacteria and their influence on the flavor of butter, one has only to think of the difference between sweet cream butter and that made from ripened or sour cream, and then consider that this difference is wholly due to the growth of these minute plants in the cream during the process of ripening, to be convinced that bacteria play a very important part in fixing the flavor of butter.

The temperature employed during the handling of the cream or making the butter has a very decided effect on the grain, high temperature making it soft, while too low a temperature gives it a "tallowy" consistency. Of course overworking is a common cause of injury to the grain.

As regards the color, it is impossible to lay down any standard. The English market. which is so much sought after, demands a very pale shade, while local tastes favor a more pronounced color. Among the faults of color we put such things as mottles, white specks and white thread-like streaks, three things much confused but all due to different causes, and the result of bad butter-making, as we shall presently see.

Salting is also a matter of taste, and the buttermaker must be guided by the wishes of his customers.

Having said so much by way of introduction, let us turn now to the practical consideration of the subject. Time will not permit me to dwell on the separation of the cream from the milk, about which a good deal might be said, even though it is more or less of a mechanical operation. We cannot pass over the ripening of the cream so lightly, however, because here we have one of the most important parts of the process.

We hear a great deal nowadays about pasteurizing cream. It is said that a large proportion of the Danish butter is made from pasteurized cream. It has been tried in Canada but chiefly in an experimental way. The pasteurizing of cream is based on the theory that a temperature of 158 degrees Fah destroys most of the bacteria which develop in milk or cream, and thus leaves a clean "soil" for the introduction of the proper "seed" in the shape of a starter.

In practice, however, it is somewhat difficult to heat a large body of cream to a temperature of 158 degrees Fah. without heating some part of it to a higher degree, an then there is trouble with the cooked or boiled flavor. In fact a "cooked" flavor will b noticed at 158 degrees, but it passes off after cooling. The cream must be cooled quickly after being heated for ten or fifteen minutes. When the appliances for doing this work are brought nearer perfection than they are at present, the labor and attention required may be much lessened. In the meantime my advice to buttermakers is to go a little slow, and do not attempt this sort of thing unless you understand thoroughly what you are undertaking, and are sure you will be able to carry it out properly.

The use of a "starter" in butter-making is all but universal. If the cream is pasteurized a starter is an absolute necessity. A great deal has been claimed for the "pure culture" starters, so-called, and I have no doubt very beneficial results have followed their use, but I am inclined to think that much of the improvement is due to greater care exercised in handling the cream. It is natural that if a man tries anything of the kind, he will take a little more pains and watch it more closely. I do not think that the flavor of butter made from good pure milk can be much improved by the use of any starter, but in creamery work there is always some milk not quite up to the mark, if not positively bad. In such cases a starter prepared from some of the best milk is a decided advantage.

Another point in favor of the starter is that it enables the maker to ripen the cream at a lower temperature. Bacteriologists tell us, and experience confirms it, that a temperature of about 60 degrees Fah. is favorable to the development of the best class of fermentation in ripening cream.

Before we touch upon the question of churning it may be well to refer briefly to the character and composition of butter fat. Everybody knows that the fat in milk, and in cream before churning begins, has the form of tiny globules invisible to the naked eye. It does not consist of one single fat but a mixture of several kinds which may be divided into two classes, viz., fixed fats and volatile fats. The latter form only a very small part of the whole, and probably have more to do with flavor than bulk. The fixed fats are divided by Blyth as follows :

Stearin Palmitin	50 per cent.
Olein	40 per cent.
Butyrin	17 "
Other fats	3 "
	100

Stearin is a hard white fat which melts at 157 degrees Fah. Beef and mutton tallow are largely composed of Stearin. Palmitin is also a hard white fat with a melting point about 12 degrees below that of Stearin. It is found in palm oil, etc.

Olein is an oil at ordinary temperatures. These three fats are very common in nature, but the next, Butyrin, is found only in butter, and is the characteristic fat of milk. Olemargarine contains no Butyrin.

When cows are on dry feed there is a larger proportion of the hard white fats in the butter, while such as grasses, silage, etc., produce more of the oily fat. This explains why butter is usually harder and whiter in winter. For the same reason we have to use higher temperature in churning in the winter time as a rule. It is thought that the fat is in a liquid condition in cream and solidifies as a result of the agitation in the churn, when the globules begin to adhere to each other.

When churning proceeds too rapidly, as a result of too high a temperature, only part of the fat is solidified and the balance, or part of it, is incorporated with it in an oily state ; hence the reason why such butter is always soft and greasy.

It is obvious from the foregoing that no fixed temperature can be laid down for churning. It must be varied according to conditions, but should always be done at as low a temperature as possible without taking too long. Half an hour in summer and a little longer in winter is about right.

Washing the butter is an important part of the process. I do not believe in much washing if the butter is for immediate use. One water will usually be sufficient. Too much cold water will destroy the fine flavor, because the flavoring oils are largely soluble in water. If the butter is to be kept for some time it is better to wash until the water comes away quite clear.

The temperature of the water used for washing has a great deal to do with the grain of the butter. If it is too cold the butter will come out too hard and dry, a very common fault in the winter time. If on the other hand the water is too warm the butter will of course be soft and retain too much moisture. The proper temperature leaves the granules of butter in such a condition that they can be handled without gathering into a mass and at the same time adhere readily when pressure is applied. The right temperature will vary considerable according to circumstances. So much depends upon the natural consistency of the butter that no rule can be applied other than the condition in which the butter is found after washing is finished. If the cows are on dry feed the butter will be hard owing to the large proportion of Stearin present. Cotton seed meal has a tendency to make hard butter, while linseed meal has the opposite effect. Experiments have shown that the melting point of butter was on the average six degrees higher with a ration of cotton seed than it was when linseed meal was fed to the same cows. The temperature of the washing in such cases would have to be varied to about the same extent. Generally speaking from fifty degrees to fifty-five degrees will be about the right temperature, except in hot weather when a lower temperature will be required to counteract the influence of warm air during working.

The salt should always be applied while the butter is in the granular state. The maker is enabled then to distribute it well throughout the mass, and that being done very little working is required. I prefer salting in the churn, if one knows how much butter there should be in order to get at the proper amount of salt. I cannot understand why some makers will persist in pressing the butter into a mass before adding the salt, and even applying it during the process of working. When that is done the butter must be worked more than it should be to prevent the mottled appearance due to uneven distribution of salt. I need not impress upon anyone the necessity for using the very best salt for butter-making—that is well known. A fact perhaps not so well known is that salt will, if exposed to strong odors, absorb them to such an extent as to impart the same to the butter.

The butter should be worked at a temperature about fifty degrees to fifty-five degrees. If too cold the grain is injured by the heavy pressure required and a certain amount of grinding which the butter will receive from the worker. The surfaces exposed to the rollers will be given a "lardy" appearance which will show as white thread-like streaks under the trier. When too warm the surplus moisture cannot be expelled without overworking the butter.

If the salt has been well distributed while the butter was in the granular condition very little working will be required. I prefer to have it stand three or four hours after the salt has been applied before the final working. If the temperature is right I think a better texture or grain will be secured. Of course I do not dispute that fancy butter can be made by finishing at once after removal from the churn, but I think more uniform results will be obtained the other way.

Now, in conclusion I have only a few words to say regarding packages. One must be guided in the choice of packages according to the market he is catering to. If for immediate consumption in local markets, there is nothing better than the standard square print.

We put up nearly all our butter at the Dairy School in this way, and I want to describe our style of doing it. The butter is first wrapped in parchment paper, and then each pound is placed in a thick paper box which folds tightly and almost completely excludes the air. The paper box prevents the parchment from drying and curling up, and is help in preserving the butter. It is very convenient for the merchant and has a dainty appearance. Both parchment and box have the name of the school printed thereon. When this butter is shipped to Montreal or other markets it is packed in 20lb. cases, which are made the exact size to hold that many prints. They are made of thin lumber simply nailed together, and are not returned. The total cost of parchment wrapper, paper box and shipping case is less than one cent per pound. I am satisfied that we double the cost in extra price received for the butter, besides always finding a ready sale for all we make.

The square box is fast replacing the tub for packed butter. It fact I may say it has replaced it on our side of the line, where we began using it in 1892. The idea is to have a box that will hold fifty-six pounds, or half the English hundred weight. In order to do this it must measure one cubic foot. A solid cubic foot of butter weighs slightly more than fifty-six pounds, but butter is never packed perfectly solid and something ought to be allowed for shrinkage. We always put fifty-seven pounds in each box The best shape for the box is square, only slightly larger at the top than at the bottom in order that the butter may be turned out. The dove-tailed box is generally preferred to one that is nailed. Spruce is the favorite timber. White poplar is said to be suitable, but I have had no experience with it. No matter what kind of wood it must be that grown on high land and be thoroughly seasoned and kiln dried. The inside of the box should be coated with parafine wax. I would not use any other kind. If not waxed the box must be soaked and scalded in the same way as tubs are treated, and then they get out of shape. Of course they are lined with parchment, but that does not take the place of "soaking" or other treatment of an unwaxed package, as many seem to suppose. It is merely an extra precaution I believe the reason that we have been hearing so much about "mouldy butter" for some time past is because butter makers have been depending entirely upon the parchment paper to protect the butter. There certainly can be no foundation for the claim heard in some quarters that butter moulds more readily in boxes than it does in tubs made of the same wood and treated in the same manner ; the box is calculated to preserve the butter better than the tub. Boxes should be filled full of butter cut off level with top, the parchment folded over, and the cover, which should rest on the butter, firmly nailed. When I say firmly, I do not mean that three-inch nails should be used so that it will be necessary to break the cover to get it off. A thin nail with a large head should be used. A number ot patent covers are on the market, and I think the best of these are likely to supercede the nailed cover.

The President : I have bought a large lot of butter this year, and the best article I have found in that line, put up in attractive shape, has been that purchased from the Kingston School. I have had to pay a little more for that butter, and partly because it had a little more style about it so far as the package was concerned. They put up what the people want, in a way that they want it, and they get a good price for it on that account.

Mr. George Graham : These papers contain a good deal for the wealthy fellows with the separators and all the other appliances, but "the poor ye have always with you." I have only the more primitive modes of raising the cream. I have found it difficult at times to get the butter to come, and it has often occurred when feeding alsike.

Mr. James Whitton : My friend should get a separator. Alsike, red clover, straw, or any other fodder may be fed to a cow, and by using the separator the cream must come. With the ordinary creamer, set the cream in cold water at a temperature of forty-five degrees. After I secure the cream from the milk, if I have not enough for a churning I put it in a can specially for that purpose and let it remain until I get enough to go on with. When I get sufficient cream in the can, I place it in a temperature of sixty-five degrees in order to ripen. As soon as I see evidence of thickening I get it at a cooler temperature, say about fifty-eight degrees. If you collect daily it will take twenty-four hours to ripen ; if you collect every two days it will require eighteen hours, and for three days twelve hours. The time for ripening, of course, must depend largely upon the time of collecting.

A Member : What about freezing before churning ?

Mr. Sprague : That would develop a bitter flavor, caused by what is called lactic alkali.

Mr. Hopkins : What about coloring butter ? A speaker to-day said we should not color cheese.

Mr. Sprague : The butter should be colored to suit the taste of the people who buy it. If they want white butter do not put any color in ; but if they want it colored put coloring in.

The President : I entirely agree with Mr. Sprague. If you are making for the Canadian people give them the color they want ; if you make for the British people give them the color they prefer. Harris Lewis had a blind customer to whom he sold white butter. When the blind man heard that it had not been colored he was quite mad, and told Mr. Lewis that if he had known the butter was not colored yellow he would not have eaten it. Mr. Lewis said he colored the butter for the blind man after that.

A Member : Why does it take those tiny fat globules so long to get heated through ?

Prof. Dean : My friend wants to know why it takes three or four minutes for these very small globules of fat to get heated. That length of times is allowed for the expansion of the globules, so that they will hold together. These globules are not good conductors of heat, and so it takes some time to produce the necessary expansion.

Mr. A. J. Potter : Do you advocate the paying of milk according to the Babcock test ? Why is it that it has not become more generally adopted throughout the Province

Mr. DERBYSHIRE: Some farmers hold that it is no use to talk about paying for milk by quality as well as by weight. They do not want it. But suppose one of these was my neighbor, and he had a steer worth $75 and I had one worth $50, and we both sold them at the market, and when the money was being paid I said: "Here, neighbor, let us pool the receipts and divide up evenly, so as not to cause any hard feeling or jealously," and so on, what would my neighbor say? (Laughter.) You pay for quality as well as by weight in nearly every other article of food or drink. If you furnish better milk you should get paid for it as being better milk. This would be an incentive for a better cow, better stables, better feeding, better and more milk, better patrons, better prices and better neighbors.

A MESSAGE FROM THE ONTARIO MINISTER OF AGRICULTURE.

The SECRETARY read the following telegram from Hon. John Dryden, which was received with loud applause:

"Important business requires my presence in the Legislature to-day, and I am sorry I cannot attend your convention. You all know you have my hearty co-operation as you continue to proclaim the gospel of superior production in the dairy industry. Our butter, as well as our cheese, must capture its rightful place in the British market. Tell our farmers to forget the improper methods of the past and take for their motto in the future 'Excelsior! Excelsior!'"

THE MODEL CREAMERY AND CHEESE FACTORY.

By PROF. H. H. DEAN, O.A.C., GUELPH.

Models, or ideals, exist largely in the imagination. Every man has an ideal of what a woman should be, but he has never found it. The model creamery or cheese factory does not exist, even in this good county of Victoria. Where and what should such an establishment be? The model factory should be located in a district where there is plenty of pure water and a good soil Many factories and creameries are not a success for the simple reason that they are not supplied with an abundance of good pure water. Good soil is also required to grow plenty of the best food for the cow with the free flow of rich milk. Now, you have in this county a good soil, and you have it well watered. You can grow all the crops necessary to feed the dairy cow. You can raise corn here as well, or perhaps better, than we can at Guelph. Corn is the plant upon which the dairy farmer has largely to depend to-day Clover is also a necessary crop, and you do well with that here. Mr. Wm. Rennie, Farm Superintendent at Guelph, lays much stress on the importance of growing clover and its place in the rotation. We never know a failure in the crop of clover at the College, and it is only on very lean and barren soils that clover fails to catch and make a good crop. Peas and oats should also be grown. Every farmer who has cows should make provision to grow next season a patch of peas and oats ready for the drying up of the pastures. Good roads should lead to the ideal creamery or cheese factory. Every man who is interested in dairying should give his hearty support to any movement that will give us better roads.

As regards the patrons of the model creamery, the first thing we require of them is that they should be neat and clean in person and habits. I fear that only a small proportion of our patrons have fully imbibed principles which have developed into habits of cleanliness and tidiness in everything pertaining to the dairy. The habit of untidiness too often begins at home with the child. The boy comes home from school and kicks his rubbers into a corner, or into different corners, hangs his coat anywhere handy and drops his hat on the table or the nearest place he can find. There is no method in training him into neat habits, and when he comes to look for his things he cannot find them. That lad grows up, and what do you find when you visit his place? Doors off their hinges, implements lying around rusting and ruining and no method marking his method of doing things. He will stumble over a stick of wood every day in the week and will not think of picking it up, simply because he has no idea of order and neatness. We look to women for a good example in this matter, for men are naturally slovenly, while women are usually neat and tidy; but when you get an untidy woman she is the most slovenly creature in the world. To have a model dairy succeed we must inculcate habits of cleanliness and neatness among both men and women. I fear that the surroundings of our factories and creameries, our stables and barns are every year becoming such as to make it more difficult to make first-class butter and cheese. The atmosphere in which milk or cream is kept must be always pure.

The model dairyman should be a good feeder of his stock. On Monday of this week we got a cow in from a man who lives about seven miles from the Dairy School. I asked the owner if she was a good cow and he said she was, but that she was a little thin. When we got the cow in we found that she was nearly half starved. The average cow in this country would nearly double her production if fed better. No cow, no matter what her breed, is able to produce her full quantity of milk except she is properly fed. The quantity of milk we get from a cow's udder depends a great deal upon the amount and quality of that which we put into her mouth.

The patrons of the model cheese factory or creamery should be paid according to the amount of skill and labor they put into their work. Man is so constituted that he generally labours according to his reward. Pay a man fifty cents a day and you need not expect much from him; but if you pay him $1.50 per day you will find that he will do much more for you Of course, some men do not look for a reward in cash, but in honor and glory, while others are ready to take everything in sight. We shall never have an ideal factory until we pay the patrons for the thought and skill they bring to their work, and according to the genuine value of the milk they send for cheese or butter-making. How are we to determine the value? I have no hesitation in saying that the value of milk for cheese-making depends upon the amount of butter fat and casein contained in it. The best way to determine the amount of butter fat in milk is by using the Babcock tester; it is not an ideal test, but it is the best thing we have to-day. Now, there is room for some difference of opinion as to the best method of dividing money among patrons of cheese factories. Dr. Babcock and other high authorities say that the butter fat alone determines the value of the milk for cheese-making. Others say, "Pay us by the weight of milk and only by that." My own position is in favor of the use of the Babcock test, but we should also take into consideration both the fat and the casein or curdy part of the milk. How are we to get at these two factors? To determine the casein in the milk we need a chemical laboratory and a skilful chemist, which no factory can afford to have. But happily we find that casein varies but little. Casein averages about 2.5 per cent. in milk. The loss of casein and fat in the whey is usually about four to five-tenths of a per cent. Our plan, and one which comes nearest to the actual results, is to add two for casein to the reading of the Babcock test. The effect of this is to decrease the premium placed on the butter fat, as is the case where payment by fat alone is practiced. When we add two to the percentage of fat, we have the recoverable percentage of fat and casein in the milk for cheese-making purposes.

The question has been asked: Why have not factories generally adopted this system? One reason is that some factories will not go to the expense of $50 or $70 to ascertain the value of the milk Another reason is that some cheese-makers have discouraged it because they do not know how to use the tester. Such makers have not enough enterprise to attend the Dairy School for a short term, or even to get the inspector to come and give them instruction in using the Babcock tester. Any good cheesemaker could learn how to make the test in half a dozen lessons. Then there are some fellows who are non-progressive, and never want to learn anything new. Too many men are satisfied to pool milk for no other reason than that it has been the custom in the factory for the past fifteen or twenty years. Then there are some who honestly believe that the Babcock tester cannot tell the amount of butter fat in the milk. Let me assure you that properly handled the Babcock tester can tell very fairly the quantity of fat in milk; and therefore I claim that any factory that will not use this test is standing in its own light. One of our graduates who went to a factory to make cheese said that it used to take 10¾ pounds of milk to make a pound of cheese when he first took charge. He got the directors to buy a Babcock tester, and he began to make tests, and he has now got it down so that he can make a pound of cheese in that same factory from something like 10½ pounds of milk. In every factory where the Babcock tester is used it takes less milk to make a pound of cheese than formerly. Some people are so weak that they cannot resist the temptation to milk the pump, or let the open milk can stand out in the rain when the good Lord sends a shower. These temptations should be removed from them. This Association has had seven men on the road this summer giving instructions in cheese and butter making. I regret to learn that some of these men have had to spend a good deal of their time with police magistrates prosecuting delinquent patrons. I hold that they would have been much better employed instructing makers, and giving hints on improving factories generally. The general use of the Babcock tester will enable these men to do their legitimate work of instructing, and the industry will make more rapid progress. Paying by quality of the milk, as seen in the fat and casein, will greatly hasten this desirable condition of affairs.

Milk should be strained before being sent to the factory. If you were to see the sort of stuff that sometimes attaches itself to strainers and other dairy utensils, it would surprise and disgust you. Some people seem to think that cow hairs and dirt of various kinds mean nothing in milk. I once heard a woman say that she would not eat cheese from a certain factory because she had been there and had seen the strainer. Milk should be strained immediately after being taken from the cow. In our own practice we use gauze strainers, with four thicknesses of cheese cloth fastened on the bottom with a tin hoop. If you use a cloth strainer be sure that it is thoroughly scalded, or rather boiled, which will disinfect it. Too much attention cannot be given to the matter of straining milk. The milk should then be kept in a clean place, and when waiting for the carrier it should be placed under cover. I have noticed that in some places in those fine cheese counties of Glengarry and Leeds they are building coverings for the milk stands.

The milk should go to the creamery or cheese factory in clean cans, and in clean wagons, for I have known occasions where you could smell the milk wagon before you saw it. Of course such cases are not many, but I hold that one such case of filthiness is too many, because one cannot tell when it may tell against us. The milk wagon should be scrubbed every week or two with lye. The horses that haul the milk should also be clean, and they should be driven by a clean man; and someone has described a clean man as one who washes himself at least once a week. (Laughter.) It is only by paying attention to all these points that we can hold our present position in the cheese market of Great Britain, and if we are to get the inside track with our butter, even more attention must be given than we have bestowed upon our cheese.

The factory itself should be clean. It should have a covered driveway. There should be no old boilers, or vats, or curd sinks, or tumble-down wood piles, seen around the factory yard. It is useless for a factoryman to talk cleanliness to his patrons if they can see a dirty factory every time they drive up to his place. Example is better than precept. The factory should be well drained. No bad smells should be permitted about it. In the Black Creek factory, owned by Hon. Thomas Ballantyne, they ran the drainings through the ground about fifty feet away. They lift it to the filtering bed by an injector and let it drain away to a distant part of the lot, changing the location from time to time.

The model factory should have a competent maker—one who has a Dairy School certificate. Such a man should be paid what he is worth. There are many factories that are losing the wages of a good cheese-maker every year, because they will not employ a man who will make a first-class article. A quarter of a cent a pound will pay the wages of a good maker.

At the model factory or creamery only the best supplies will be used. Where there is so much competition in rennet and coloring matter the tendency is to cheapen these at the expense of quality. Many makers have had a good deal of trouble this year because of bad rennet. I would like here to qualify a statement I made this morning about coloring cheese. So long as people want colored cheese we will have to give it to them. But why do makers color cheese or butter? Is it not practically to deceive the people? However, when the people get their eyes more fully open on dairy questions, and find that coloring does not add to the cheese, they will not want it done. I prophesy, that ten years from now there will be very little colored cheese made in this country.

A good curing-room is a requisite of every cheese factory. Very few have properly equipped curing-rooms. The ordinary box stove is not suited to warming a curing-room. If such a stove is put in the middle of a curing room the cheese near by suffer by some of the butter fat running out. Cheese one foot from a stove will receive four times the heat that a cheese two feet away will. And a cheese one foot away will receive sixteen times the amount of heat that one four feet away will. For this reason the curing room cannot be properly heated by an ordinary stove. There must be a good circulation of air. In the ideal curing-room the cold air should be brought to the heater and warmed up. The modern cheese-curing room furnace, with openings at the bottom of the casing for cold air to enter and with an extended non-conducting casing to protect the cheese near by, seems to be an ideal heater for a cheese room.

The ideal cheese factory is one in which butter is made in the winter, and I hope the time will come when we will not make a pound of butter on the farm—when it shall be made in the creamery. Then the farmer's wife will be relieved of the drudgery and toil of making butter, for to-day she is the hardest worked person in the land. Let us make cheese for six months and butter for six months in our factories. The model creamery will help to make the model farm home.

A Member: What is a starter? Does all butter need a starter?

Mr. Ruddick: You can make butter without a starter, but it will take you longer. The object of putting in the starter is to sow a good flavor that will impart itself to the cream in which it is put, and so enter into the butter. A starter is simply a little sour milk of a pure or desirable flavor, which will hasten the ripening and give its own flavor to the cream in which it is put.

CANADIAN FOOD PRODUCTS IN GREAT BRITAIN.

Mr. W. T. Crandall, of Picton, was introduced as one of the Dominion Government agents in Great Britain, and expressed pleasure in again meeting the Association, as about ten years ago, while mayor of Picton, he had the honor of welcoming the Association to that town. He had felt the responsibility of his position—looking after the interests of Canada in England, so far as its food supply was concerned. There was a great field for development there; no one can fully comprehend its magnitude as an emporium until he visits the various food depots or market centres. The Canadian Governments had taken much pains to develop our trade with the motherland, in the interests of the farmer. They have helped to improve the quality of butter and cheese by bonusing dairy associations and establishing dairy schools, and to-day some of our brightest lads are attending these schools

But after we have raised our horses and cattle, our pigs and our poultry, they have to be sold. The Government has decided to help the farmer to the best markets and to open up plans for the rapid and careful carriage of perishable products. There was a feeling sometime ago that our best markets lay with our neighbors across the line. We admire and love our republican neighbors, and would like to trade with them on fair terms, but they have practically told us to mind our own business, and their markets are largely closed to us. We have, therefore, to turn to that great food mart of the world, and the parent country of our own, Great Britain. That nation invited all the other nations of the world to bring their surplus food products without let or hindrance; and as part of the great British Empire, we are proud that in some lines, such as cheese, we take a high place in supplying the need of the people over there.

Mr. Crandall then gave some interesting figures to show the importance of the British market. Great Britain imported $600,000,000 worth of food stuffs, not including dried fruits, spices, teas, or coffee. Her importations of cheese were valued at £4,184,656 sterling, and he was proud to say that of the foreign countries Canada took the lead in this, with £2,589,301, and the United States only £1,234,037. Britain's importations of butter last year were £15,344,364, or about $750,000,000. Denmark got the most of this trade, supylying £6,288,413. Holland came second with £1,186,126. Sweden third, £1.164,685. United States fourth, £617,529, and sad to relate, Canada fifth, with £339,744. It was satisfactory to note, however, that last season Canada followed closely on the heels of Denmark in point of quality, the Danish commanding the top price, and Canadian second best. England imported £4,164,656 worth of eggs, aside from what she produced herself. Canada supplied only £178,931 of this. There was a time when Canada exported $2,000,000 worth of eggs to the United States, but they placed a duty of five cents a dozen on them and practically shut us out.

There was need for Canada to look more closely after her own interests in the British markets. He regretted to have to say that Canadian produce was being regularly sold in Great Britain, not as Canadian but as Irish or English, or something else. Prosecutions had been entered in the police courts of Liverpool against retailers who had sold Canadian bacon as Irish, Cumberland or Wiltshire. As an illustration he told how the late Mr. Wright, of the Walker house, Toronto, had eaten some delicious breakfast bacon at a hotel in London, England, and asked the hotel keeper to kindly give him the name of the dealer so that he might bring some home to Canada for his personal use. The dealer, on learning that Mr. Wright came from Canada, frankly admitted that the bacon had been cured in Toronto, but that it could not sell so well under its own name. There was an association in Great Britain to see that foreign produce was not fraudulently sold as British, and the Canadian Government were determined that Canadian produce should have protection. Every facility had been provided in the shape of cold storage to land the goods in good condition, and when all this trouble had been taken it was nothing but right that Canadian produce should reap the benefits their merits demand. If they lacked anything they could stand the consequences, and the point that he emphasized was that the Canadian farmers had to give the Britishers what they wanted. He took poultry as an illustration in this connection, remarking that because it was not handled as it should be it sold for 7d per pound, alongside Irish and English turkeys that realized 10d to 1s. In conclusion Mr. Crandall declared that there was a great future before Canada for agricultural products in Great Britain.

COLD STORAGE.

By Prof. J. W. Robertson, Ottawa, Ont.

The main purpose of cold storage, as we use the term in connection with our export trade, is to have the products of this locality and every other part of the country carried in the finest condition to the British consumer, who is the best customer on the globe, taking him in either his individual capacity or as a nation. John Bull is particular about his food; the individual Englishman is a most discriminating buyer. With him eating is a matter of business, and in that respect he is most "diligent in business." A man goes into a restaurant in Liverpool or London, and instead of letting someone belonging to the establishment select his chop or steak for him, he marches to the place where the heap of chops, etc., may be, picks out his own, and then he eats it as one who enjoys his choice. The workman's wife goes out and inspects the cheese or other food, and does not say, " I want some cheese," but says " I want some of *that* cheese," or " *that* butter." They are discriminating buyers. Some products are sold at a higher price in Great Britain than in any other country, and they are also sold at a lower price if out of condition. All classes of people there are remarkably well fed. Dainty food, in the best condition, is bought by the rich people at fancy figures, and by the well-to-do work people are high prices. If it is of an inferior quality or out of condition it goes to the tables of the poor at ruinously low prices. The British workman will eat only good food. I once paid a visit to Whitechapel, the low part of London, to look at the mode of living of the poor of that city. Even there I noticed that they were well fed. I saw shops in that quarter where you could buy cheese for four cents a pound, and mutton was selling at five cents a pound. These articles were a little out of condition, but they were still nourishing. I regret to say that some Canadian products were going to that quarter of London, and selling at these low prices, simply because they had gone out of condition by want of proper facilities for transportation and storage. Cold storage will do away with that.

The British market is a large one. The immense amount of $600,000,000 is paid out for twelve of the staple articles of food imported, which Canada can supply of the best quality. Although that market is 3,000 miles from us, the distance is really no great obstacle. Cheese can be sent from Lindsay to England for a cent a pound.

Everything that forms a part of our system of transportation should be made as good as possible. There should be good roads from the fields to the barn, from the barn to the factory, and from the factory to the railway station. Then good railroads from the station to the ship's side, and cheap, safe, regular transportion across the ocean. We cannot have too much in the way of good, cheap transportation, right to the vessel upon which our produce is loaded; and we must arrange to continue the good roads, so to speak, across the sea to the very end of the journey. But we must remember that if we start with stale butter, poor cheese and bad products generally they will not be improved by any system of rapid transit or cold storage. The butter, for instance, must be made in first-class style at the creamery, and kept in first-class condition from the moment it is made until shipped from the creamery and placed in the hands of the distant consumer.

The speaker then exhibited a blue-print of a model creamery with cold storage, which was passed along for inspection. Such plans, etc., would be sent free to all who would apply for the same to him at Ottawa. He then continued : " The value of cold storage is to keep things from spoiling while they are being held, and also to lengthen the season when they may be marketed. By the use of cold storage pears may be kept for three months or longer. I know of some Bartlett pears in cold storage to-day, and they are not yet ripe. It is a good thing for a man to have a little more choice as to the time when he may sell, and cold storage gives him that chance. Cold storage enables us to keep goods in the best condition all the way to the ultimate market, and as a rule the sooner they are sent there after they are ready the better the trade will be.

During the year just closed the Government provided for cold storage by arranging with various lines of railway, on which there was a reasonable amount of butter to be carried, to provide refrigerator cars once a week. Seventeen cars were running weekly, picking up butter for the export trade, and the Government is willing to extend that service where it is required. It is always safe for a Government to spend money in starting a good thing for a limited time if the people can carry it out profitably themselves afterwards. The Government has arranged that on these special cars products are carried at the usual "less-than-carload" rates. Seventeen steamships, fitted with cold storage, sail from the port of Montreal, and three are arranged for from the Maritime provinces.

We are increasing our butter trade, but we did not do so last year as much as we might, on account of the high price of cheese in June. In 1894, when the cold storage business was first initiated, the exports of butter from Montreal were 32,000 packages, while this last season 220,000 packages were exported, or an increase of about seven fold. England imports about $75,000,000 of butter annually, or about twice the value of her imports of cheese. We get the biggest share of the chese trade, and why should we not expect to get the greatest share of the butter trade, too? We must, and we shall do so. We should aim to get all our products sold there under our own name. Too often our foods have been handled there under other names. Our bacon has been sold as the best Irish, our cheese as the finest English or Scotch, and our eggs as French.

The Professor then spoke at length upon the scope and intent of the Dairy Act of 1897, and covered the same ground as in his address on "Dairy Legislation" delivered at the convention of the Western Cheese and Butter Association, which appears in this volume under that heading.

ELECTION OF OFFICERS.

The report of the Nominating Committee was received and adopted upon motion of Mr. J. R. Dargavel, seconded by Mr. James Whitton. The list of officers will be found in the appendix.

The President in a few earnest words thanked the Association for the unexpected honor of re-election, and hoped for the further success of the Association and the dairy interests of the country.

REPORT OF INSTRUCTOR G. H. BENSLEY.

I have much pleasure in submitting to this Association this my fifth annual report of the work done in the district allotted to me, viz., the counties of Addington, Lennox and Frontenac. The names of factories and the number of visits each received are as follows:

Harrowsmith	2
Palace Road	3
Centreville	4
Tamworth	2
Farmers' Friend	2
Glenvale	2
Forest	3
Union	2
Cataraqui	2
Gilt Edge	2
St. Lawrence	2
Wolfe Island	2
Ontario	2
Silver Springs	2
Arigan	2
Cold Springs	2
Inverary	3
Railton No. 1	3
Sunbury	2
Excelsior K	2
Odessa	3
Parham No. 1	1
Railton No. 2	2
Hartington	2
Moscow	2
Whitman Creek	6
Albert	2
Phippen No. 1	2
Forest Mills	2
Keenan & Son	2
Pine Hill	2
Pine Grove	2
Howe Island	2
Morning Star	2
Model	3
Tichborne	2
Sharbot Lake	2
Bear Creek	2
Excelsior, N	2
Napanee	1
Union	1
Platt	2
Deseronto	1
Croyden	1
Bell Rock	3
Enterprise	6
Phippen No. 2	2
Selby	2
Maple Leaf	2
Leo Lake	2
Glenburnie	2
Perth Road	2
Battersea	2
Sand Hill	2
Sydenham	2
Oso	2
Hinchinbrooke	2
Iron Junction	2
Parham No. 2	2
Fish Creek	2
Spring Valley	2
Rose Hill	2
Granite Hill	2
Thousand Islands	2
Sillsville	1
Farmers' Choice	2

In accomplishing this work 140 days were spent in testing milk and instructing, 15 days in attending cheese boards, travelling and attending court—making in all 155 days in the employ of the Association. Of the 5,700 samples tested by me, I found 16 to be deteriorated, all of the parties being fined. This is the unpleasant part of our work, but from the number who are found tampering with their milk every year it is evidently very necessary they should be looked after. A far better thing to do would be to pay for the milk according to the quality. Then if a man sent skimmed or watered milk, that is what he would get paid for. Besides, it would have a tendency to make the patron take better care of his milk, which would be profitable to himself and beneficial to the cheesemaker. I am pleased to say that in the section allotted me this past season I found the patron waking up to his own interests as regards care of his milk. I must say I found a decided improvement, and as a natural consequence there was a marked improvement in the quality of the cheese.

The amount contributed by factory men for my services was $380; amount in fines, $150, making in all to the Association, $530.

Regarding the quality of the cheese in my district, I am pleased to say it has improved. One great trouble in Kingston section is there are about one-half too many factories, thus cutting up the section so that factories are too small to be profitable either to the proprietor or maker. As a result the owners of a number of them are unable to pay from the profits of the business an experienced man to manage them; and consequently there are a number of young, inexperienced makers at the business who should be working under instructions. This is a great mistake. A proprietor of a factory should hire nothing but a first-class man. Even though he pays him a few dollars more he will find him the cheapest man in the end. I might just say here I was pleased to find such an improvement in the quality of the rennet from last year, and there was plenty of room for improvement. In conclusion I thank the people in my district for the kindness extended to me while in the discharge of my duties among them.

The President: There are too many factories too close together. There should be fewer factories in many townships, and a better quality of make. One good factory, properly equipped, and with a well trained, well paid maker, is worth two or three of the average small affairs sometimes seen on almost every four corners.

REPORT OF INSTRUCTOR HOWEY.

I have much pleasure in submitting to this my third annual report as instructor and inspector of this Association for what is known as the Belleville section. The applications for my services were double those of last year, showing the factorymen are alive to the business. The factories seemingly most in need were first visited, and in all sixty-five factories received 138 visits as follows:

Foxboro	3
Union	2
East Hastings	2
Roslin	2
Moira	2
Zion	2
Hollaway	2
Eclipse	2
Frankford	2
West Sidney	2
Sidney Town Hall	2
Grove	2
Quinte	2
Plainfield	2
Bronk	2
Glen	2
Shannonville	2
Mountain	2
Melrose	2
Springfield	3
Thurlow	2
Front Sidney	2
Rosebud	2
Hilton	2
Brighton and Murray	2
Mountain View	2
Weller's Bay	2
Cloyne	2
Boundary	2
Flinton	2
Victoria	2
Clareview	2
Murphy	2
Harlon	2
Rock	2
Cedar	3
Bogart	2
Stoco	3
Roblin	3
Thomasburg	2
Tweed	2
Moira Valley	2
Empey	3
Mitchner	2
Cloverdale	2
Allisonville	2
Bengill	2
Bethel	2
Bloomfield	2
Northport	1
Central	2
Point Traverse	2
Cherry Valley	2
Union	2
Royal Street	2
Union Vale	2
Maple Ridge	2
Marlbank	3
Money More	2
Reid	1
Clairview	2
Sheffield	2
Camden East	3
Newburgh	3
Ketcheson	2

In accomplishing my work of 158 days, 138 were spent in visiting factories and giving instructions and testing milk ; the remaining time was spent in making flying visits, travelling, attending boards of trade, and settling milk cases.

Of the 8,752 samples tested, 33 were found to have been tampered with, 26 of this number paid fines to the amount of $405 and the remainder are not settled with yet. The amount of fines netted by the Association was $202.50, the amount contributed by factories for my services was $375, making a total to the Association of $577.

Throughout the whole district I cannot see as much improvement as we should have, and do not expect such to be the case until that class of cheese-makers who try to manufacture first-class cheese in these old dilapidated buildings quit submitting to such conditions, for so long as employers get men to sign such contracts, just so long will the country meet with this great loss annually.

In conclusion I thank the Association and dairymen for all the kindness and courtesy shown me throughout the season.

REPORT OF INSTRUCTOR KERR.

I herewith submit my first annual report as instructor and inspector. The district allotted to me was the western district of Eastern Ontario, comprising Peterborough and Lindsay. The two cheese boards, namely, Lindsay and Peterborough, applied for my services, each factory wanting from two to three visits, so I devoted all my time among these factories. The factories and number of visits each received are as follows :

PETERBOROUGH BOARD.

Melrose Abbey	3	Trewern	2	Perry Town	2
Norwood	3	Lakeview	2	Hope	2
Daisy D	3	Central Smith	3	Kendall	4
Ormond	3	Missing Link	3	Orono	3
Westwood	2	Cherry Grove	2	Blackstock	3
Oakdale	2	Peterborough	2	Darlington Union	2
Warsaw	2	Shearer	2	Fleetwood	3
Warminster	2	Lang	2	Myrtle	1
North Dummer	3	Keene	2	Mt. Pleasant	2
Maple Leaf	3	Bensfort	2	Crown	1
Lakefield	3	Otonabee Union	2	Cedardale	1
Pine Grove	2	Cavanville	3	Stoney Lake	2
Young's Point	4	Fraserville	2	Hampton	1
North Smith	2				

LINDSAY BOARD.

Janetville	3	Fenelon Falls	3	Leaskdale	2
Reaboro	3	North Verulam	3	Derryville	2
Omemee	3	Cameron	3	Minden	2
Maple Leaf	3	Cambray	3	Ingoldsby	2
Dunsford	3	Valentia	2	Palestine	3
Star	3	Pine Grove	2	Lorneville	2
Bobcaygeon	3	Northrop	2	Mariposa	2
Red Rock	3				

Of the 149 days comprising the season, 102 days were spent in testing milk and giving instructions, 24 in making running visits between factories, 8 at milk cases, 8 travelling, 3 attending cheese boards, and 4 detained on account of rain.

The amount of money contributed by factory men for my services was $399 ; the amount from fines $192.50, making a total to the association of $591.50.

The number of patrons fined for sending deteriorated milk was 36. The amount of fines imposed was $385.

Quite a number more than the 36 I found tampering with their milk, but on account of their impoverished circumstances the board of directors of these factories and myself decided to let them off with a warning. This is a very unpleasant part of the business, and I strongly advise factory men to adopt the method of paying for milk according to quality.

Of the 5,033 samples of milk tested with the lactometer and 2,764 with the Babcock tester, eight samples tested from 1.5 to 2.0 p.c. butter fat; 45 from 2 to 2.5 p.c.; 198 between 2.5 and 3 p.c.; 949 between 3 and 3.5 p.c.; 754 between 3.5 and 4 p.c.; 196 between 4 and 4.5 p.c.; 10 between 4.5 and 5 p.c; and six samples from 5 to 6 p.c. The above figures prove the necessity of paying for milk according to quality.

It gives me much pleasure to report favorably on the quality of cheese made in a great number of the factories in this district, especially in finish. The makers are improving wonderfully in this particular. I must say I found a marked improvement on my last visit; I believe the makers are trying to see who can make the neatest appearance. But on the other hand there are a few factories that are behind the time, and, as we all know, it would be money in each cheese-maker and patron's pocket if all cheese made in this district would reach perfection. Another point I wish to speak of is this: At a number of our factories in this district I have seen patrons going to the factory with their milk at as late an hour as eleven o'clock in the hot summer days. Now, this should not be. The patrons should arrive at the factory early enough to be unloaded and away by at least eight o'clock. I would also advise that where a milk route is drawn on one wagon every patron should have his milk can on a stand at the road gate, so that the milk drawer will not lose any time in opening and shutting gates and driving lanes. This is an important thing, and by doing so you will give your cheesemaker a better chance to make a fine cheese.

As there will probably be some discussion on the manufacture of cheese, and as I speak at the factories of any fault I have to find, and time is limited, I have condensed this report as much as possible, but I will be pleased to give any further information regarding my work if desired.

Mr. James Whitton: We need to emphasize the fact that it is dangerous for milk to come to the factory as late in the day as Mr Kerr complains of. In our section the milk is left by the wayside, and by the time the wagon turns into the lane, gets the cans and is on the road again he could have gone a mile. It often happens that the milk is not in the factory early enough to make good cheese.

The President: No man living can make good cheese from milk brought to the factory at eleven o'clock on a midsummer day. It should be there at eight o'clock. Give the maker every opportunity to do the best work. Most factories are near enough—too near, often—to enable milk to be brought in time.

REPORT OF INSTRUCTOR LOWERY.

I have much pleasure in submitting this my first annual report as your instructor during the season of 1897, of the work done in the sections allotted to me, namely, Stirling, Madoc, Campbellford and the western part of Belleville section. I visited 78 factories; the names and visits are as follows:

Queen's	2	Castleton	2	Burnley	2
Spring Brook	3	Standard	2	Spring Valley	2
Rylestone	2	Norham	2	Roseneath	2
Meyersburg	2	Deloro	3	No. 2 Shamrock	2
Coderington	3	River Side	3	Brickley	3
Gwynne	3	Cook's	2	Prince of Wales	2

Marmora	2
Victoria	2
Round Lake	2
Star	2
Seymour West	3
Valley	4
Woodland	3
Brae	3
No. 1 Shamrock	3
Rodger	3
Model	3
Trent Bridge	2
I.X.L	3
Wooler	3
Cedar Hill	2
Edville	2
Salem	2
Wicklow	2
Grafton	2
Hilton	1
Maple Leaf	3
Big Springs	3
Bell	2
Kingston	3
Beulah	2
White Lake	2
Alexandra	3
Marble Springs	3
Queenboro	3
Brook Valley	3
Spring Hill	3
Cold Springs	3
Spring Creek	3
Daisy	3
Central	3
Empire	3
Beaver	2
Morganston	2
Warkworth	3
Brighton and Murray	1
Evergreen	3
Plum Grove	4
Stanwood	3
Crow Bay	3
West Huntingdon	2
Madoc	3
Oak Leaf	3
Golden	3
Enterprise	3
Spry's	3
Stirling	2
Harold	3
Forest	3
Monarch	2
Newcombe's Mills	3
Baltimore	1
Greenview	1
Bancroft	1
Beechmont	1
Ormsby	1

In accomplishing this work I spent 160 days in the employ of the Association, and 78 factories received 192 visits. In all 7,068 samples of milk were tested with the Quevenne lactometer and 3,786 with the Babcock tester. Of this number 60 were found to be deteriorated and, by order of the presidents, I settled 51 cases and 8 were dealt with by the managers of factories. The amount contributed by factorymen for my services was $280.25, and the amount received for fines $269.35, making a total to the Association of $549.60.

Regarding the inspection of cheese factories, I found the majority in very good condition for cleanliness and very well equipped for making cheese. The cheese I found on the whole to be of a very good quality, but in some factories I found some cheese that were very open. This I attribute to not sufficiently maturing the curd before salting.

I would advise cheese makers to be very careful in taking in milk, and not allow patrons to put salt in their milk, for it will certainly affect the action of the rennet. One sample of milk I tested this season was salted so heavily that it raised the Quevenne lactometer reading to 42 at a temperature of 75 degrees and 3.5 per cent. of butter fat. I think, too, that cheese makers should be more careful in purchasing thermometers, for I found in going among the factories several thermometers from 2 degrees to 5 degrees astray. This is a very important point for cheese makers.

A word to patrons: Aerate your milk in the morning as well as in the evening, as, I contend, it is just as important to aerate the morning's milk as it is in the evening's. I found in one particular factory, where the maker was having a great deal of trouble with gas, that the patrons were quite unacquainted with the fact that milk required to be aerated in the morning, and by so doing you would greatly assist the cheese maker and also benefit yourselves. I would say in conclusion that in the sections I covered this season, I found the most deteriorated milk in factories not visited by an inspector in former years.

Mr. MORGAN JOHNS: Do I understand you to say that some patrons put salt in their milk? What is the object of that?

Mr. LOWERY: They put it in to prevent the milk from souring.

The PRESIDENT: And to try and deceive the man testing at the factory.

REPORT OF INSTRUCTOR PURVIS.

I take pleasure in presenting this, the report of the fifth year's work as your instructor. As you are aware, the executive last spring cut the territory formerly allotted to me in two, and appointed another man to look after the western part of it, leaving me the four eastern counties of the Province, in consequence of which I was able to meet nearly all my applications and to do more and I trust better work than in former years.

I began work on the 26th day of April and kept on till the 5th of November, working in all 160 days, 136 of which were spent in factories giving instructions and testing milk, 19 in driving, and 5 in attending court and settling with parties guilty of sending deteriorated milk to factories.

Following is a list of factories visited by me and the number of visits given each:

Aberdeen (a)	2	Glen Becker	1	Denison's	2
Caloran (Pond Lily)	3	Pendleton (1)	3	Wendover (b)	1
Dominionville	3	" (2)	3	" (c)	1
Lodi	4	Cedar Grove	1	South Branch	1
Wert (10)	3	Maple Leaf	3	Wyman's	2
Wert (3)	3	Aberdeen (1)	1	Riceville	3
Tid Bits (1)	2	Athol	1	Nation River	3
" (2)	2	Goldfield' (1)	4	Wood's	3
" (3)	3	" (2)	1	Strathmore	1
Sunrise	3	B. B. (6)	1	Centrefield	1
S. Indian	3	Wendover (F 32)	1	The Lake	2
E. T. C	2	Plantagenet	1	St. Thomas	3
Farmers' Joy	3	Alfred Centre	3	Empire (b)	2
Gallingertown	2	Cousineau	1	Apple Bee	1
Rose & Co. (2)	1	O. K.	1	Bubeau	1
Black River (1)	1	White Rose	1	Routhier	3
" (2)	1	St. Amour	1	Pine Grove	1
Bainsville	1	Glen Robertson	1	Mongenais	1
Kirk Hill (2)	1	Roseberry	1	Lunenburg	3
" (5)	1	Dixon	1	Russell (6)	1
" (6)	1	Siloam Springs	3	" (9)	1
Touraugeau (1)	1	Ottawa Valley	1	" (10)	1
" (2)	1	Ethier's	1	Boundary	1
Finch	2	Rob Roy	1	Daniston	1
Eastman's	1	St. Albert	1	McLean's	4
North Valley	1	Newington	1	Pressault	2

Making 78 different factories and 136 visits.

I had less trouble than ever before with tampering with milk. I had twenty patrons summoned before magistrates for sending deteriorated milk to factories and one for interfering with and obstructing the test. In each case I got a conviction. Ten other cases settled with the managers of the factories where the milk complained of was delivered. This is a very good showing and goes to prove that the patrons are getting a wholesale fear of the Babcock milk tester.

I found a very decided improvement in the quality of the cheese, more particularly in the early summer make, and think that the farmers are becoming more alive in seconding the efforts of the makers in improving the quality of their product. The makers were always glad to see me at their factories, and always anxious to learn of any little points which I might be able to impart to them. The chief trouble I found with the makers, more particularly the young men, was that of using too much starter, and not giving themselves sufficient time to thoroughly cook the curd before they had to drain the whey off. A number of makers make a practice of keeping a quantity of milk over in the weighing can and in the evening running it into the vat and leaving it there all night, and in the morning running the milk, as it comes in, right in with it—a very wrong practice, as very often the milk is ripe enough without the use of a starter at all, and as a result, by the time the milk is all in, it is far too ripe to produce the best results.

The patrons are getting more particular in the care of their milk, and I saw less bad flavored and sour milk last summer than ever before, for which I thank the bulletin on the "Care of Milk," sent out by Prof. Dean and his staff, and the drillings patrons have had; and I think they are becoming educated to the fact that no skill of the cheese-maker can rectify damages that are started on the farm, and that to make good cheese the maker must have pure, clean flavored milk.

Mr. WADE: How does it happen that, notwithstanding the bad conduct of many patrons, the cheese, according to the instructors, is improving?

The PRESIDENT: That is because our makers are becoming so educated that they are able to make a good article in most cases, even where some patrons are at fault. Of course it is impossible to make first-class cheese from any milk sent in.

REPORT OF INSTRUCTOR ZUFELT.

I have the honor of presenting my first report, as instructor for the Butter and Cheese Association of Eastern Ontario. Owing to the lateness of my appointment, and to the fact that it was not generally known throughout the district allotted to me, very little actual work was done until the month of June, after which, I am pleased to say, I was kept very busy until the season closed.

Altogether, I spent 130 days in the employ of the Association, as follows:

Two days attending meeting of directors at Brockville; five days attending court and settling fines; seven days lost on account of rain; sixteen days driving and calling at factories; one hundred days actual work at factories giving instruction and testing milk, the following being a list with number of visits to each:

Maple Ridge	4
Algonquin	2
Glenmore	1
Augusta Model	2
Charleville	1
Domville	3
Advance No. 4	4
Rose and McTavish No. 2	1
White Clover	3
Summer's	1
Roebuck	3
Fairfax	3
St. Lawrence	1
Pittston	4
Farmer's	3
Metcalfe	3
Cold Springs	1
Gordon Model	1
Allan's	1
Reid's Mills	3
Millar's No. 1	1
" No. 2	1
" No. 3	1
Grenville	1
Canada's Pride	3
White Globe No. 3	1
" No. 4	2
Sunrise	3
Tidbits No. 1	2
" No. 2	1
Osgoode No. 2	3
Shanley	3
Warburton	1
Deer Lick	1
South Lake Model	1
Central	3
Hyndman's	1
Greely	3
North Osgoode	3
Osgoode Centre	1
Dickey's	3
Coldbrook	1
Kendrick's	1
Sharkey's	3
East Matilda	3
Rutherford	3
Perry Creek	3
South Matilda	1
Gananoque	1

The amount of money received to be paid into the funds of the Association is as follows: Fees from factories, $355; half the fines collected for adulterated milk, $367.50; total, $722.50.

It is appalling to consider the number of people still to be found who will adulterate milk. Of the forty-nine factories visited, sixteen—or thirty-three per cent.—had patrons who were tampering in one way or another with their milk. Altogether thirty convictions were made, and the total amount of fines collected, after deducting costs, was $735, or an average of nearly $25 each.

It is quite apparent from the foregoing that the time of an instructor is largely taken up with prosecuting dishonest patrons rather than in giving instruction to the cheese-maker and other work more likely to further the interests of cheese-making, and I would strongly urge that this Association do all in its power to induce every factory to pay by the Babcock system.

The general condition of the factories was fair, and although the cheese-maker in the majority of cases was doing his best, still, in some instances, he was handicapped on the start by having a factory which was poorly built and located without any regard as to drainage, one of the most important features in the construction of a factory, and to this cause alone may be traced a large percentage of the defects found in cheese. I also find that the curing-room is a source of a lot of the maker's trouble. Want of proper ventilation and means of controlling the temperature of the room has spoiled what otherwise would have been fancy cheese. In fact, it is almost impossible to make a strictly fancy cheese where the temperature of the curing-room rises and falls in sympathy with the weather. This brings me to a point which I wish to emphasize, viz., that there are far too many small factories in the country. In some places they are to be found on nearly every four corners. This means, in a large number of cases, poor buildings, poor makers and poor management, all tending to depreciate, rather than advance, our reputation abroad. It is gratifying, however, to note that improvements are being made in both the equipment and management of the factories, especially the larger of the co-operative ones and those managed by private individuals, and much credit is due some of these for the example they have set for their neighbors to emulate, especially in regard to the introduction of the Babcock system of paying for the milk, instead of the old and dishonest way of pooling.

I thank you one and all for the assistance you have given me in my work, and I trust I have done at least something to keep the name of Canadian cheese still at the top of the list.

The President: The reports read by the various instructors have been really first-class, and the work they have done has been excellent. You can see, however, from the large number of fines that there are many people still willing to live on their neighbors by pouring water in the milk or by skimming. We shall have this continued just so long as we retain the present system of paying by weight alone and not also considering quality. There is only one way to overcome this, apart from a work of grace, and that is by taking in the milk according to the amount of butter-fat there is in it. This poor milk trouble gets into the home, the church, and into politics—neighbors falling out and becoming enemies on account of the moral weakness of some. It is a serious thing to charge a man with adulterating milk. The Babcock test is positive proof. It tells every time just how much butter-fat there is in the milk. Sometimes the Babcock test is not required; for when you can see a mosquito a foot down in a milk pail you can depend upon it that somebody has been watering that milk.

A Member: Can you pass a law making all factories take milk according to the test of butter-fat?

The President: That would be compulsory and we could not do it. If I were sending milk to a cheese factory on the pooling plan I would buy Holsteins, and select my cows until I got a herd that would send a big flow of milk to the factory without regard to quality; but if the other system was adopted I would also have to consider richness of milk as well as quantity. Instructor Publow is now at Ottawa looking after the case of a man who has been fined. The case has been appealed, but we are going to follow it up if we have to take it to the Privy Council. During the coming year we are going to watch milk-tamperers more closely than ever.

REPORT OF INSTRUCTOR PUBLOW.

In submitting this ninth annual report of inspector and instructor of this Association, I feel that there is comparatively little new to state, as the work has been carried on along much the same lines as in previous years.

Notwithstanding the addition of a new man this year, the applications for services are still more than it is possible to overtake, there being 250 factories in the district allotted to me alone.

Of the 162 days in the employ of the Association, 126 were spent in giving instructions and testing milk, 12 in travelling and visiting factories, 8 detained on account of rain, 5 in Montreal inspecting rejected cheese, 4 attending cheese boards, and 7 attending milk cases. The factories visited were as follows:

Riverside.
Mississippi.
Elm Grove.
Ardoch.
Redan Queen.
Roseville.
Lone Star.
Stanleyville.
North Shore.
Ontario.
Model.
Bedford Mills.
Centreville.
Ardmore.
Mountain View.
Westport.
Salem.
Fermoy.
Lake View.
Clear Lake.
Rockdale.
Maple Grove.
Morton.
Dominion.
Elgin Model.
Portland.
Harlem.
Chantry.
Plum Hollow.
Forfar.
Phillipsville.
Island City No. 1.
" No. 2.
" No. 3.
Ompah.
Newboyne.
North Star.
Maple Grange.
Glen Buell.
Riverview.
Stanley.
Star.
Glen Elm.
Gilt Edge.
Seeley's Bay.
Elbe.
Lombardy.
Robinson's Mills.
Newbliss.
Standard.
Lyndhurst.
Farmersville.
Leeds Union.
Farmers' Own.
Elmdale.
Ashton Union.
Ottawa Valley.
Gold Medal.
Maple Leaf.
Maple Valley.
Bonnechere Valley.
Union Star.
Burnstown.
Harper.
New Glasgow.
Bathurst Mutual.
Clareview.
Taybanks.
Fallbrook.
Tayside.
Scotch Line.
Black's Corners.
Prospect.
Tennyson.
Valley Queen.
Brookside.
Watson's Corners.
Poland.
Clyde.
Hopetown.
Middleville.
I. X. L.
Lanark and Darling.
Clayton.
Pakenham.
Rosebank.
Rosedale.
Boyd's.
Montague.
Mud Creek.
Appleton.
Drummond.
Elphin.
Dalhousie Lake.
Barlow.
Farmers' Friend.
Clear Spring.
Goodstown.
Burritt's Rapids.
Pleasant Valley.
Huntley Centre.

Of the 9,000 samples of milk tested 45 were found to have been tampered with, and of these 40 were fined $950, a much larger sum than last year. Most of these fines were imposed in factories that had not been visited for two or three years. This state of things confirms me in the opinion I have expressed to the Association more than once, that the time must come when factories will be required to pay for milk according to quality rather than quantity.

The amount contributed by factories for services was $450—some $80 less than last year. This difference is due to the fact that so many factories had three visits this year. The total netted to the Association from fines and fees is $900.

Cheese from a number of factories was rejected this year, principally on account of bad flavor. On visiting these factories several causes were found, namely, dirty milk, feed flavor (such as turnips and rape), bad rennet, bad water, and poor curing-rooms. In many cases, too, the makers fail to make the most of what is at their disposal and keep the cheese at too high a temperature while curing. It is imperative that more attention be paid to curing than has been in the past, as improvement in quality will come largely in this direction.

In conclusion, I would recommend the makers to be more particular about the milk received, and accept none but what they are sure they can manufacture into fine cheese. Also to see that the condition of factories requiring them to guarantee to make first-class cheese is favorable for the work.

The PRESIDENT: Mr. Publow fines every delinquent just as much as he can. If a man is a first offender perhaps we should be lenient; but if he repeats the offence, then we will be as hard on him as possible. We will not, in future, permit any one to tamper with the milk sent to a cheese factory.

Mr. S. R. Payne : How will the Association get on if this fining business stops ?

The President : We will have no trouble about raising our revenue. You must remember that half the money we get from fines goes back to the factories, and is divided between the honest patrons. It is a premium on honesty, as it were.

Mr. J. A. Bell : We have been buying our milk by the Babcock test, and only one patron has expressed dissatisfaction with it, although we have seventy patrons in our creamery. If good for a creamery, it should also be good for a cheese factory.

A Member : I would like to ask Mr. Bell what kind of cows had the man who found fault with the test ?

Mr. Bell : They were Shorthorns. One month he got credited with 3.8 per cent., the next month it was a little less than three, and the following month it went up again. I cannot tell what was wrong.

The President : That will be revealed on the last day.

Mr. L. L. Campbell : Is it possible that the same herd would vary with the Babcock test ?

The President : If the animals are neglected it will make a difference in the quality as well as the quantity of the milk. The same man should milk the cow, morning and evening and always. A cow is just as jealous as a woman. (Laughter.) If you disappoint a cow by not milking her at the right time she will hold up some of her milk. If milk is bought according to its real value, more care will be taken of the cattle and of the milk, and prosecutions will soon cease.

Mr. Payne : Every man who attempts to use the Babcock tester should have a certificate from a dairy school.

The President : There should be no possibility of a mistake permitted against the patrons. The day will come when every man managing a factory will have to be able to show a certificate from a Government dairy school.

THE DAIRY AND THE SILO.

By Joseph Gould, Uxbridge, Ont.

For many years I was in the lumber business, and to some of you it may seem an impertinence for me to talk to you with any authority on dairy matters. But I will speak to you about that which I do know. I know that the cow must be studied individually. I know that her feelings must be considered. I know that in milking a lot of cows they must be taken in their regular order, for best results. I know that when I go home after being away from my cows—the ones I personally milk—I shall find that they have fallen off in their yield of milk by a few pounds. I milk seven cows and my man milks seven ; we always milk the same cows, and in the same order. We keep a record of the quantity of milk given by each cow at each milking. I was a little surprised to see that only one man here was able to tell Prof. Dean how much milk his own cows gave him. The men who made me a dairyman were Mr. D. Derbyshire, of Brockville, and Mr. John Gould, of Ohio, both of whom are here to-day, the one in the chair, and the other on the platform. Mr. Derbyshire once talked with me, and gave me some good advice. I then took " Hoard's Dairyman " and I read an article in it by Mr. John Gould. I got thirteen cows, and after testing them, I culled several, and have since been selecting and raising a better quality of milkers. By keeping a record I have been able to cull out the poor milkers and select and develop the better ones. The following is a record for my herd for the last year:

No. of cow.	Age.	Breed.	Months milking.	Lbs. of milk.	Fat test. (p.c.)	Lbs. of butter (10% added to lbs. of butter fat).
1	14	Grade Durham	10	7,579	3.8	316.48
2	8	" Jersey	10	7,824	4.0	344.43
3	7	" Ayrshire	8	5,875	3.8	246.12
4	8	" Jersey	10	6,701	4.2	309.58
5	10	" "	10½	8,557	4.4	413.72
6	5	" "	10½	7,588	4.0	338.37
7	3	" "	10½	5,434	4.4	252.99
8	6	" "	10	7,029	4.6	323.39
9	3	" "	7½	3,616	4.4	172.01
10	5	" "	10½	6,643	4.6	336.12
11	2	" " ¾	7	3,137	4.8	166.62
12	2	" "	7½	2,813	4.6	132.32
*13	12	" Durham	7	4,654	3.6	184.46
*13*a*	3	Thoroughbred Jersey	2⅔	1,181	5.2	68.65
14	3	" "	9½	4,962	5.2	256.32

* These animals were traded for each other—even deal.

The average yield of the dairy cows of the Province is estimated at about 250 pounds of butter. The average of my herd is 301 pounds. My best cow has given me 413 pounds of butter in the year. (Applause). The average cost of feeding my herd is $27.95. It will be of interest to you to know that I bought an Ayrshire cow for $21. She had every indication of being a good dairy animal. I could not make out what was the matter with her that I got her so cheap. I soon found out. She kicked the side out of the stable the first day, and then kicked the boy out through the hole. (Laughter). But I never struck her or punished her in any way, and she soon got to behave well, and gave a splendid yield. Before I used the Babcock test and the weigh scale the poor cows were robbing the others and were robbing me; but I soon got from "I guess so" to "I know so."

In 1896 we were making $10,000,000 worth of cheese, $1,000,000 worth of creamery butter and $6,500,000 worth of home-made butter, much of the latter being fit only for cart grease. But had that home-made butter been made in the creameries it would have been worth $9,000,000—or a gain of $2,500,000 to the country in a single year. I agree with Prof. Dean that if the average cow was properly fed and housed she would double her product. We have lost $20,000,000 more every year on that account. I believe ensilage corn is going to enable us to remedy this.

At this point Mr. Gould exhibited a model of a circular silo, and showed its working. A summary of his description follows:

It is desirable in building a silo to get as much depth as conditions will permit, so as not to have too much of the surface exposed. In a silo sixteen feet in diameter two inch plank any width up to ten inches will do, and twenty feet long, if possible. If the planks are not long enough, have them spliced. The plank must be jointed but not bevelled on the edges. The foundation may be of stone if convenient, but nature generally gives a good enough bottom. Make a rim of double inch cedar boards, like the rim of a curb of a well, and of the size intended to be built. Bend the first hoop after the foundation is laid, putting the nuts on the extreme ends, and lay two inches from the bottom by temporary blocks. Bend the fifth hoop, and raise it twelve feet from the bottom by means of stays and plumb over the lower hoop. Raise the first plank, and set on the foundation inside the hoops. Then plumb the edge, drive a four-inch wire nail through under each hoop and bend round, and the plank will stay in its place. Set up the planks all the way round until the circle is completed. Tighten the hoops already on, put on the other hoops between them, and the silo will be ready for use The hoops are made of five-eighth round iron, threaded at one end The blocks may be hard wood (endways) or cast iron. You can easily get a blacksmith to weld them, if necessary. The silage is damp, and will soon swell the boards and make them fit close. If the hoops are too tight in a few days, slacken them, so as to avoid a burst. Put tar paper over the knot holes to keep out the air. To get the silage out cut three doors in the side, about 18 x 24 inches, bevel the edges so as to fit a door; do not put hinges on, but tack tar paper over the door to keep the air out. A roof is not absolutely necessary. In winter some pea straw and a few poles to keep it in place will suffice. A circular silo 16 x 20 feet will hold about 80 tons of ensilage. Mine is 9¾ x 20 feet and holds about 25 tons. It has been satisfactory with me. You could build a similar one for at least $25—that would be a dollar a ton capacity. We feed this ensilage the whole year around. We feed about ten pounds a day in summar, and the cows eat it with avidity.

A MEMBER: Will frost affect the ensilage?

Mr. JOSEPH GOULD: Yes, it will freeze; but it can be thawed out inside of twenty-four hours, and the cattle will eat it readily. The silo is here to stay.

THE TYPICAL DAIRY COW AND HER DEMANDS ON THE DAIRYMAN.

BY JOHN GOULD, U.S. DAIRY AGENT, AURORA, OHIO.

Never before in the history of American and Canadian agriculture has the demand been so imperative that the farmer should take an inventory of his productive stock, based upon its actual value—and this value shall not be a fictitious one, but according to its producing power, its actual condition. Farmers must reorganize their business along business lines. We are finding farmers making the same complaints about the same things all the time. It is the same thing whether here or in Ohio. The nineteenth century is celebrating its exit by putting all farmers in the same list. You look over the list of the world's products and you will find that farmers are nearly all doing the same thing. They are all putting their surplus products in the same granaries of the world, and that granary is settling the prices for all. The prices in New York, in Liverpool, in Calcutta are all about the same, less freight. It used to be said that the supply could never be kept up to the demand, but the last five years have shown that the supply is getting ahead of the demand. This is brought about because these men, all over the world, are following along in the same lines of production, and are putting their products in the markets of which we have had control heretofore, and putting in with it too much inferior produce that the market does not want. Now we say there is an under-consumption, but when we look it all over there is no under-consumption, because the world is eating as it has been heretofore. Of course, there are lots of tramps, but they are all eating at somebody's crib. There is no chronic indigestion of the world's peoples, causing an under-consumption. Some say it is caused by the coinage of silver, and some one thing and some another, and they get to squabbling about it, and yet the conditions remain the same, and it is for us to talk the matter over among ourselves, and see if there is not something the matter with the men themselves. We must go into the economics of farming, and must have a comprehensive view of our business. I don't mean by "economics of farming" restricted living, but an economy born of better judgment, better understanding, better administration of all the affairs of a farmer's life. The man who is going to succeed in farming, or in any profession, will find that the profits of the future will come from saving on certain lines now considered of no consequence and unworthy of notice. Turn the odds and ends into account; thus the farmer of the future will succeed. This applies to the dairy, as well as to other interests. Our business must be reorganized from the foundation up, and these odds and ends must be carefully inventoried, and see what we can throw out and what we can save.

Another question: The competition in the dairy business. The dairyman finds himself in as close competition as those in other business. A few years ago New York was going to control the dairy business. We in Ohio had control of the Mississippi valley trade, and we said, "Hands off, this is our property," but in a few years we found Canada was in close competition with us, and the great west besides. There is another point: Wherever agriculture gets one-sided—needs balancing—there must be an equilibrium restored, and you will find the cow was always brought in to balance the agricultural business In Illinois, when the corn farming became one-sided, she brought in the dairy cow, and to-day Illinois dominates the price of butter in the United States —with her Elgin butter. Iowa followed suit, and last year, with butter at eighteen cents a pound, exported $33,000,000 worth, in addition to what was consumed at home. She exported more butter than all the combined silver mines in the United States produced in value. Ohio is now third, and Illinois, Iowa and New York are in competition for the dairy products of the United States. Minnesota has joined the procession with 750 creameries, and there is no end of creameries the world over.

Then we thought we had the cheese trade, but the people in Australia got tired of raising kangaroos (laughter), and went into the dairy business, and now they put 50,000 boxes of cheese down in London and Liverpool every thirty days. This was our trade three years ago, and now it is gone over to them. We really have more competition than we enjoy. (Laughter.) How did it happen that the man in Australia went into dairying? When he did begin he had a "cinch" on us, as they say. This man needs no barns for his dairy cow; only a cow-yard, and the whole continent for a pasture, and only at a cost of $1.50 per acre. This is competition we must meet, but how? The freights, you say, will fix that. Why, the outgoing ships to Australia from England must come back with some kind of load; formerly, they were compelled to come back in ballast, but now they bring cheese for ballast, and lay it down on the docks at Liverpool for one cent a pound. We must understand this. It comes to this: The farmer in Canada must reorganize this business along the lines of economy; along definite known lines.

The question I am to discuss is the typical dairy cow. Perhaps we might first ask about the dairyman, and find out what he knows about his business, for no man, in whatever business, can trust to luck and succeed. "Moon signs" don't go nowadays (laughter), and a whole lot of us are doing one of two things, either "farming in the moon," or we have a conception of what dairying should be (Laughter.) When we think we know it all, we find that many of the things we think we know are not facts, and then we say luck is not with us. This man must take an inventory of his business capacity and find out what he is good for first. A chain is no stronger than its weakest link, and if any industry succeeds or fails, it is because of its strongest or its weakest links. The chain we work with has in its centre the man as the link. If the man-link is strong enough, all right; but if the man-link snaps, we lay it to everything we can think of, and sometimes we are mean enough to say that "if the wife had had better health, we might have done better." (Laughter.) Or they say, "Father dairied this way, and grandfather dairied thus and so, and they succeeded, and why shouldn't we succeed?" The conditions are different. When grandfather dairied nature was pretty lavish with her material, and left it all around loose. The market was not very discriminating, and everything went. To-day things are different. We have dug the fertility out of the soil and sold it in the half bushel. We have done it until nature says, "I can't be prodigal any longer," and so nature has combined to lock up our business. She has locked up the fertility of our soils, and Professor Voorhecs, of New Jersey, has written a book which should be called the key to the combination lock of this fertility. He has given us the key, but perhaps it is a time-lock, and our time may be so short we will never get into the safe. (Laughter.) We must know more about this fertility, and we must not waste our resources. How could Professor Voorhees succeed if his knowledge went no further than the knowledge of the average man? We must study and get down into the dairy mysteries until they are revealed to us in all their fulness, or we will never succeed, either as farmers or dairymen. Have you ever known a man to succeed by waiting for luck to come to him; and, on the other hand, have you ever seen men fail who delve down into mystery of cause and effect? The dairyman is no exception to the rule.

We stand facing one of the greatest mysteries of nature. But, you say, the old brindle cow is only a cow. There is no greater problem existing to-day than this same old brindle cow. Life, reproduction of life, motherhood! Study it—study this question of animal life. We know nothing about this cow we are working with. Some people will tell you it is not necessary to study about this dairy machine, that they can dairy with their own machines, and don't need to know anything about the machines their neighbors are dairying with. There was a time in Ohio when it was the practice to dairy with a combined machine, but that time is past, never more to return. Nobody looks for speed in a draught horse, and nobody hunts foxes with a cur dog, and yet we find many people, all over the country, dairying with a cow they expect to be good for everything. They want a cow that will give lots of milk when they sell milk, and when they want to patronize the creamery, expect her to give rich milk, and so on down the list. This cow gives about 3,500 pounds of milk in a year, and yet we are not asking too much when we say we want better results than this. We need a cow that will give six, seven and eight thousands pounds of milk. There is the question. We want a cow for butter, and how does she look? You all know how she should look, and you all know how the best cow you have ever had has looked, and how your neighbor's best cow looked, and yet we turn our faces away from this and try to insist that food makes the difference—that food makes the breed. As a result, we are not getting food cost out of breeds, but costly breeds out of the food. This cow should be a cow that will give us more in the pail than we put in the manger, in value. Many of you are dairying with cows where you put a certain number of dollars in the manger and get a return of one-half in the pail. We must have cows that will give us $7.50 for every $5 we put in her manger, if we want to succeed in dairying. So, to-day, this whole question comes down to the selection of our dairy cows. I do want to tell you that the value of the cow is in her ability to produce butter-fats. The cow that gives us a large milk production with but two and a half per cent of fats is not as desirable as the cow that gives you less milk with five per cent. of fats, even if she only gives half the quantity, for you don't want to milk so many tons of water for nothing. It is all right, perhaps, if you send it to Toronto (laughter), but the thing is the waste. The value of the milk consists, not in the weight of water she may give you, but in the quantity of solids.

Here let me say a word about pedigrees. Pedigrees do not put butter-fats in the milk. They simply let you know what that cow's progenitors were on one side or both, and may help you to decide, as Governor Hoard says, how to get a little more "red-headity" in our cows. (Laughter.) We must judge for ourselves as to the value of the cows we are feeding, without regard to their pedigrees, and you will find out, at last, that you can only succeed by having a well-selected herd, where individualism is the main thing.

Another thing: If you have a five, six or seven thousand pound dairy your cows will all have more or less resemblance to each other—a very strong resemblance, in fact. That resemblance is along certain lines. We must have individualism in the cow, and, here let me say, this individualism is born in the cow, and is not fed into her and is not made. I can feed anything I like into the cow, but I cannot change her individuality. If she goes in a little milker you can feed her as you like, and she comes out the same way—a little milker still. All you can do is to increase the amount of milk she gives, but you cannot change her one profitable particle. I can do what I will with this brindle cow, but she will never give me a daughter better than herself, and I must have a strong dairy type if I would reproduce it. We must have some heredity. Get a strong dairy type of male and breed half-breeds. These are often the best all-round dairy cows we have. The only trouble is it stops there. You can only do one thing. You can only breed on in the same line. Make prepotent the things you need, get strong blood—heredity. Perpetuate the strong type of the originator by selection, using every care, and you may get good results in time. How does this dairy cow look? I have been asked this question, and have answered it by saying we want femininity as contrasted with masculinity. The masculine type is not what we want. That is the beef type. We must look to the amount of milk, and guard against failures in breeding. Do you know that the strong beef type is almost impossible to breed milk from? On the other hand, a long line of breeding intensifies motherhood. The man who best succeeds is the man who recognizes in its highest type this question of motherhood. It means stronger milk-giving powers, stronger in their attachment. The strongest type of dairy cow has a knowledge almost human. The man who can succeed in having his cow transfer her affection from her calf to himself will best succeed as a dairyman.

This dairy cow is not large; she weighs about 1,000 pounds; she is something like a racehorse, for speed in the horse and milk in the cow are allied. Beef in a horse and beef in a cow mean strength always. It is a question of nerve-power, and that is something food will not produce, only maintain. For the typical dairy cow you must have the race-horse type, bony and muscular, whether she be a Holstein, a Jersey or whatever she may be. You will find her with bony head and strong jaw, long between the eyes and the nose, with broad muzzle. She should have a very bright, protruding eye—I want a cow I can "hang my hat" on her eyes. Why? Simply on account of her brain-power. It means strong nerve-force, and that means action later on. I want a thin neck and retreating brisket The lines above and below must not be straight or she will steal from you; I want her slightly depressed behind the shoulders, with sharp chine; I don't want too straight a back-bone. She must have large organs of production—you don't want a cow with a straight back; I want her wedge-shaped. I want two wedges, large in rear and large heart-girth, *i.e.*, wide between forward legs, sharp on shoulder. This gives me large heart-action and the strong arterial circulation I want. Then last, but by no means least, she must have a good udder, for one-half of the value of a cow is in her udder. She should have a long udder from front to rear. Then she must have a good handle on each corner of her udder. (Laughter.) And why? Because if she gives two pails of milk a day it is a matter of some labor to milk her.

Now, about that milk-vein business I am a little shaky, yet I used to be very confident about it, because they said the larger the milk-vein the more milk the cow will give, but, when I found there was no milk in it, and that the blood in it went the other way, I must confess I had great doubts about the value of the large vein. Its value is that it simply shows a full, strong veinous circulation of blood. If she is wide to the rear and wide between the forward legs, you are pretty sure to find a big vein: you will hardly find the three apart, and you may be sure of good heart-action. Your typical cow should be strong, robust and vigorous. She must give you two or three pails of milk, and to do this she must eat and must be in a condition to assimulate her food properly, and her food must be succulent. She should eat in the neighborhood of 100 pounds of succulent food each day, and that does not go into a small barrel; therefore, she must have room in her silo for much food—she must have a fifty-five gallon stomach, and then we can make blood and milk, other things being favorable.

Another thing: Never have anything to do with a dairy cow that is smooth in front of her hips; it should drop in sharply, for that indicates expansive force, and that is what you need. A round-barreled cow is rarely ever worth anything. We must breed for brain and nerve. A dead-eyed cow is not worth anything, either. I never saw a sleepy-eyed cow worth driving home.

Your cow must have these traits of femininity prominently displayed; she must have large traits of motherhood, must be a large performer, and able to give a large amount of milk, if we do not spoil her by lack of feeding judgment. We must not feed her much fatty food, but must feed to develop nerve and muscle. Never allow a heifer to get fat; keep her growing by letting her have plenty of good pasture, if possible. If she begins to get fat, change her feed to something more albuminous. By-and-by, when the heifer comes into the dairy, if proper care has been taken in feeding, she will not be predisposed to fat. Nature never knows what to do with food when the heifer, before calving, has been allowed to get lean and fat by turns—it must go to make fat or milk.

Another thing: Is the food our cows most need of the proper character? This is rather dangerous ground, for every man knows best how to feed, and he wants no interference. His wife makes the best butter ever made, and she learned it of her mother. (Laughter.) We have an idea that anything father did not do is "book-farming," and therefore to be avoided. Go back to Nature and see what she does; see if you get good dairy cows. Good dairying is artificial, and the feeding of the dairy cow is artificial. Nature gives us Texas steers, the broncho pony and Digger Indians. (Laughter.) Artificiality gives us Governors and Presidents and Premiers of different weights, (laughter) fleet running horses, fine draught horses, beef cattle, dairy cattle, sheep of different value and goats, all artificial. Every one of these high attainments is artificial, *i.e.*, changed by feeding and environment from natural causes. We have supplied what Nature was deficient in, and Nature is bridged over in her shortcomings. When the Arctic cold has come we have protected our animals with glass and lumber, and when drouth has come we have supplied the deficiency. We have been ready, here and there, to help Nature in her work. The dairy cow is artificial from the ground up; breeding, selection and feeding have developed the milking function. Do not cross too much. One man had some ordinary cattle and added a little Holstein blood, and then crossed with Ayrshire. Then he added some Shorthorn and Guernseys—and having got all these under one hide, he finds that his animals have reverted to the "mountain climber." (Laughter and applause.)

What does the wild cow of the plains do? I happen to know what she does. She gives from two to three quarts of milk daily, and then drops off in quality, and the only way to milk her is to tie her four feet to the ground, and milk her while the calf is sucking. This is the condition of the native cow, with a *native* after her. (Applause.) This cow, by breeding, feeding, selection and care, has become the cow that gives three or four hundred pounds of butter—and I have even heard of one cow that gave 1,450 pounds of butter in a year. (Laughter.) She has become the cow that gives seven or eight thousand pounds of milk—and one man claims 31,000 pounds. (Laughter.) This has been attained by supplying Nature's wants, by properly feeding and caring for the cow—by artificial means. Here is the question which confronts us, our cows want a variety of feeds, but the variety must not be all on one side. We must feed the materials they need and in the proper proportions—a balanced ration. This was one of the things I wanted to know, and did not know. I asked Professor Thorne, several years ago, what a balanced ration was, and soon received a courteous reply, saying that he was glad farmers were waking up to their needs, and he was glad to give me a good balanced ration for my cows. They wanted a proper proportion of foods, say four and one-half pounds of carbohydrates and one of albuminous extracts. I had all these things, but did not recognize them; no doubt it was a splendid ration; he showed me what he knew, but I told him it was all "hog Latin" to me, and then he said he wanted four and one-half pounds of fuel and one pound of albuminous extracts to make blood and muscle and nerve. I told him it was not clear to me yet, and then he said "your fuel is starchy food," corn and corn fodder, and I knew I had this right in my corn stalks, with 78 per cent. of fuel. "Every time your animal eats five pounds of food, about four pounds of it should be fuel, and one pound of protein flesh and muscle former does all the rest of the things needed." I asked him why he had not told me so before. (Laughter.) I said I had lots of corn and fodder for the fuel, and asked what I must use for the other pound. He said cotton-seed meal. I said I did not have that; could I raise it on my farm? No, but I could use a pound of oats instead, and there I had it all explained.

I tie my cows up every day in winter, from the 1st of December until spring opens. When my wife puts on her Easter bonnet and goes to church, I let out my cows. (Laughter.) If it is stormy neither of them go out. From April to December I have my cows in the pasture, although I believe they should have a little grain every day as well. In September and October I put them in, for I think they do better. In the summer they have eight months of exercise, and the question is whether they need exercise at all the rest of the year—whether they are not better off in the stable during the cold weather. In Denmark they are not turned out at all, but are kept constantly in the barn. Stronger and better cattle are never seen than those of Denmark, kept confined constantly. The cow must be made comfortable. No man should build a basement barn with light only on one side; build it in the shape of an "L," wide enough for two rows of stalls, and plenty of air space. Let in the sunlight, for this is a regular microbe-killer, if you please. Have a constant current of air in the barn, and no foul air will be found. Use absorbents and deodorizers. Road dust is as cheap as sunlight, and is a perfect deodorizer.

The walls of my stable are double, and outside, at the top, I cut a hole, and another at the sill, so that the cold air from below is passing up, getting warmed, and coming into the stable. Do not cut holes to let the warm air out, for it is the air on the floor you want to get rid of. On corresponding corners cut holes in the inside lining, letting the warmed air come in, and the foul air out at the floor. The warm air above warms the cold air and holds it at about 50 degrees. Then, put water in the front of them, and no dairyman who has tried the plan will say it is not a success. This is all there is about it. Give her all the exercise she wants in summer, but hold the temperature even in winter. You say you must give her exercise in cold weather to make her hardy; you might as well put them in cold storage in June to make them hardy. (Applause.)

I can distinctly remember when the average cow, or the best cow, had but little care. She was turned out to grass, and did well if there was plenty for her to eat, but if drouth came she came to her winter quarters in poor flesh and in poor condition. Sometimes we kept her in the woods and fed her stack hay and braced her against a wire fence to get electricity into her hair. (Laughter.) We don't do this now, but how much care does the cow want? Give her 365 days in the year of June weather if you can. June weather is ideal dairy weather; warm, green grass, warm water, etc. That means milking her 320 days in the year, instead of only five or six months. It means that you must give her more comfortable stables; it means that this cow must have succulent foods and more nitrogen of some sort, like oats, peas, beans and kindred varieties. When we have learned to do this properly we have learned the high art of dairying. What should her stable be? I am something of a "crank." You want to milk her every day in the year, and to do this profitably she must have her good stable, and keep her there for four or six months. To do this you must have the proper sanitary conditions—and there could be no better law on the statute books than one requiring a sanitary inspection of herds and stables. If we have this we shall have no trouble with tuberculosis. It is a question of sanitation of stables. Then your stables should be homelike, and they must be comfortable for your cows in every way. There must be no extremes of temperatures, and she must have water when she wants it, and at the time she needs it. If she has these things she is comfortable. Then she must necessarily be fastened, and I don't suppose any one in Canada would be guilty of tying a cow with stanchions, but in New York they are terribly guilty. The man who advocates stanchions argues from the man's standpoint, and has never consulted the cow. I wish we had the opinions of some cows as to their owners. (Laughter.) I think it would be interesting. We must consider the comfort of the cow, and the cow cannot be comfortable in these stanchions. Anything like discomfort for the cow means dollars out of the pocket of the owner. I think possibly some of my opposition to stanchions has been brought down to me by heredity. Way back in the early days of New England, when the Puritans were hanging the Quakers, one old Quaker friend of my fourth great-grandfather's was sent to Boston to be hanged, and this grandfather went up with him to offer his sympathy. Unfortunately, Governor Endicott did not agree with my grandfather about his visit to his friend; and he had my grandfather put in the pillory and kept him there all night, and from that day to this we have been down on stanchions. (Laughter.)

We have simply taken New England barbarity and put it in our stables and called it cow-comfort. Then let us do another thing to add to the comfort of the cow; let us take out the plank floors. Let them have mother earth to stand on. Make the floors of sod, and keep them off the plank. Another thing, put some water in front of your cows. Let them get it when they need it. A cow that gives you two pails of milk a day wants nearly 100 pounds ot water a day. Do not turn her out on a cold morning to get water, and so cold that it chills her to the vitals. Have you not noticed how she humps up her back after she comes in? You say the cow that does this is too tender. Yes, she is tender—and she takes it out of the butter-fats the next time you milk her. She had to drink 100 pounds of water to give you two pails of milk, and it has chilled her to the very marrow. No wonder she is tender.

I believe the dairyman of the future is going to make more money, but it is going to be done by hard work and careful management. Give the dairyman something more to do in the winter. We do not do much in the winter, most of us ; and too many of us are waiting for next summer, when the grass grows and milk is cheap. This is a sort of wood-chuck arrangement of going into winter-quarters. (Laughter.) We want to get some of this profit in winter, and to do this there is nothing better than a cow, well cared for, well fed, with the man at home taking care of her, rather than sitting on a dry-goods box at the store berating the administration. (Laughter.)

I do not care whether you feed corn or what you feed, in the form of ensilage, but it must be a cheap food, and then you can make something in winter, turning your crops into money instead of credit. When you do this you will have an earning power all the year round, with less trouble and less complaint.

In regard to the water for this cow. She drinks, we will say, 100 pounds a day. She drinks nearly as much as she has blood in her body, and if it is ice water she must warm it up to 98 degrees. The average temperature is 100 degrees, and we know that if this temperature is lowered six degrees she will die of a congestive chill, and if we raise it six degrees she will die of fever. By giving her ice water we send her temperature down two degrees toward her death. This will never do, and we must bridge it over in some way. Now, how to do this : We do not want a fire in the barn to warm the water, but we want the water to be more nearly of an even temperature compared with the heat of her body. At the end of her stable we want a tank for the water. We have a tank that contains about fifty barrels, and the water in this tank will not vary one degree, scarcely, in a month from the temperature of fifty degrees. The water in the tank is about of the same temperature as the barn in which the cows are kept. How many times a day will the cow drink? I asked that question the other day, and was told she would drink it as often as she wanted it. We watched the cows and found some of them drank twice, while others drank five or six times a day. One cow in six hours drank twenty times. She drank little more than if she drank but once. If we let them have water as often as they like they are at least comfortable, and the more comfortable they are the less likely they are to lose in their butter-fats.

Now, in regard to this exercise for the cow. I have never seen a cow take much exercise. I have seen them take lively exercise to get enough to live on (laughter,) but I have never seen a cow go around for it. I have heard people, who required their cows to exercise themselves to get enough to eat, complain that dairying did not pay, but if you will give this cow all she wants to eat, with water in the barn and enough to eat in the pasture, when her stomach is full she will lie down and ruminate. She starts to digest her food, and does not trouble herself about exercise. She gets exercise enough by the drain on her nerve power. A cow giving us two pails of milk is working as hard as any horse in Lindsay. Get her to eat all she will, and she will take little or no exercise in cold weather, even if she has the opportunity. Some say turn her out. What for? Not to make her comfortable, for she will be more comfortable if left in the stable. When you turn her out of her stable, leave the door open and see how much time she will spend out of doors. I am after winter milk, and I make my stables as comfortable as I can. I make them with plenty of light and plenty of water in front of the cows, and they need not go out for either. Then how often should she be fed? Some say three times a day, but I don't think she should be fed more than twice a day. I feed her silo feed and oats, and it takes her ten or eleven hours to get ready to be fed again If you think it is necessary to feed them at noon, as well as at night and in the morning, why don't you get up at midnight and feed them? If your cow can eat enough at night to last until morning, why can't she eat enough in the morning to last until evening? Give her all she wants to eat, and give her time to digest it.

One thing more and I am done. This cow, to do her best, must have the kindest treatment. Remember she is a mother. She must have a mother's treatment all the way through. This cow-mother, although but a brute, is a mother, with every instinct of motherhood, and must have the kindest treatment, with succulent food and much of a nitrogenous character, calculated to stimulate her into yet greater milk production. Win her affections. The best dairyman is he who can succeed in transferring the affection of the cow to himself, and from her offspring, and make her think he is her calf (great laughter); this is the man who will succeed. The man and the cow of the future will be the result of a better selection. (Laughter.) The food we give her must be so proportioned as to give her the necessary amount of animal heat, as well as the necessary food for her flesh and muscle. She demands a better barn, a better stable, and more care all the way through. When we have given her all this, there is still one thing more. The best product of the dairy should be made from her milk, and only the best. Keep in touch with each other, co-operate with each other. Keep up your home clubs, your Farmers' Institutes and Dairy Associations, be broad in your views and your methods, and when it is all summed up, the dairyman of the future will meet his reward, even if prices are a little lower. (Applause).

FODDER PLANTS.

By Dr Wm. Saunders, Director of the Dominion Experimental Farms, Ottawa.

One of the main objects in view in the carrying on of experimental farms is to assist the farmer in his endeavors to find out what are the most profitable crops for him to grow, and how the soil should be treated to obtain the best results; then to disseminate the information gained so that the successful course may be followed, and that which is likely to lead to failure, avoided. In trying a large number of experiments, there are many which fail. Indeed, failure is expected from some at the start; but these are tried to gain experience. In this way we are able, from our own personal trials, to commend certain lines of work and to discourage others, and thus the farmer is helped to make his business more profitable. Any good farmer can grow fairly good crops of coarse grains or fodder plants if the season is favorable and his land is in good condition; but in marketing coarse grains he must come into competition with the lower grades of labor in every part of the globe—with the pariahs of India, the semi-serfs of Russia, and the poorly paid laborers of South America. These come into competition with him now in the British markets, and that class of farming which twenty-five years ago was much followed in this country is now found to give very poor returns. Not only does the farmer get low prices for this products, but in selling these crude crops he is parting with some of the valuable elements of fertility in his land. Every crop in the course of its growth takes from the soil considerable quantities of plant food. The soil may be called the farmer's savings bank, from which, if he continues to draw without making deposits, the fertility will sooner or later be expended. Some of these elements of fertility are readily taken up; others exist in the soil in insoluble forms, which can be made soluble and available by thorough cultivation of the land and the beneficent action of air, sunshine and frost.

It is a great mistake to suppose that every crop requires the same amount and the same kind of manure. Corn, for instance, takes three times as much potash from the soil as oats. By a judicious rotation of crops a farmer can economize greatly in the matter of manure; whereas, if he grows the same crop frequently on the same land, he will not be able to use his fertilizers to the best advantage. Nature's method of co operation is a wise one. She would have the animals work with man, and man work with the animals. This will enable the man to make the best use of all he produces; and much more money may be made from animals and their products than could possibly be realized from the growing of coarse grains for sale, and at the same time the fertilizing constituents which these crops have taken from the soil during their growth, are in large measure returned to the land in the manure which the animals supply.

From the cow we get milk and butter and cheese; from the sheep, mutton and wool; from the pig, pork; and from the hen, eggs and poultry. These animals pick up and use a good deal of what would otherwise be waste materials on the farm and turn them to good account.

Mixed farming is the best sort of farming for this country. It is a poor policy to "put all your eggs in one basket." If a man has only one main crop, and the season be unfavorable and his crop a failure, his loss will be a serious one; but if he has a number of different crops he will find that what was unfavorable for one was favorable for another, and he will usually find he has fair returns, no matter what the weather may have been. Grain crops drain the land of its fertility to a considerable extent, and Canadian farmers now export a very small proportion of such products. The quantities of coarse grains exported from Canada in 1886 were valued at over $16,000,000: while in 1896 their value was only a little over $3,000,000, or about one-fifth of the amount shipped ten years ago. But while we have so largely reduced the quantity of such shipments, we have far more than made up in other exports, having added greatly to our exports in other lines of farm produce. These latter have been mostly finished products—cattle, cheese, eggs and butter—and such require more skill in their production and manufacture, and have brought us more profit.

The following table shows the quantities per acre in pounds, also the value of the fertilizing constituents taken from the soil by the more important farm crops, where the quantities of grain, straw, etc., named are harvested. In estimating the value of these fertilizers nitrogen has been placed at twelve cents per pound, phosphoric acid at 4 cents, and potash at five cents per pound. These figures given fairly represent the cost of these elements in the cheapest forms of commercial fertilizers:

Crop.	Nitrogen.	Phos. acid.	Potash.	Value.
	lb.	lb.	lb.	$
Oats—Grain, 50 bushels	32.13	10.48	8.05	4.68
Straw, 2,200 pounds	13.90	4.74	24.83	3.08
	46.03	15.22	32.88	7.76
Barley—Grain, 35 bushels	33.26	13.28	8.86	4.97
Straw, 2,000 pounds	12.22	3.86	19.39	2.59
	45.48	17.14	28.25	7.56
Wheat—Grain, 25 bushels	28.50	12.68	8.54	4 35
Straw, 2,200 pounds	12.03	4.96	10.57	2.17
	40.53	17.64	19.11	6.52
Indian corn—green weight, 15 tons	87.00	44.00	98.10	17.11
Turnips, roots only, 15 tons	49 50	27 90	82.50	11.18
Mangels, roots only, 15 tons	45.45	27.60	114.90	12.30
Carrots, roots only, 15 tons	35.25	33.30	97.95	10.46
Sugar beets, roots only, 15 tons	71 85	28.80	135.90	16.57
Potatoes, 6 tons, 200 bushels	25.20	8.40	34.80	5.10
Hay, 2 tons	62.00	16.40	52 80	10.74

If a farmer were to replace the elements of fertility taken out of the soil by an acre of oats, it would cost him about $7.76 if he used commercial fertilizers. If a man has a bank account he can present some little cheques from time to time and have them honored till he gets the last dollar; but after that his cheques will not be cashed unless he puts something to his credit. And so with the farmer and his stock of fertility in the land; he must put back some of that which he has taken out, or he will soon exhaust his resources.

The value of the fertility taken from the soil by an acre of hay (two tons) is about $10.74. That is nearly as much as some can sell the hay for. It has been said that in growing corn for fodder, it takes most of its substance from the air, as it no doubt does take a large proportion of its bulk from this source; yet, corn is an exhausting crop on the manurial elements of the soil, taking $1.14 worth from the soil for every ton of green fodder harvested. When you get fifteen to twenty tons to the acre a heavy draft is made on the land.

Oat-straw takes more of the elements of fertility from the soil than barley or wheat-straw does. At the same time it carries a larger proportion of albuminoids and fat than any of the other kinds of straw, which makes it more valuable for feeding to stock. Pea straw is even richer than oat straw—in fact, it is nearly half as rich as clover hay. The oat crop in Canada now is a very important one; it was grown to such an extent in Ontario last year that the acreage exceeded that of hay. Over 86,000,000 bushels of oats were produced in that single Province, and taking the Dominion over, the crop was probably not less than 150,000,000 bushels. How much of this do you think we sent out of the country last year? Less than one million bushels, which shows that we have almost entirely got over that bad practice of sending out our oats to the market in the crude state. No intelligent and enlightened farmer will to-day do much in the way of shipping coarse grains from his farm.

We hear a good deal about the individuality of the cow. The farmer soon recognizes the difference between the beef and dairy types of cows, but he does not always realize that there is almost as much difference in varieties of oats and other grains. One of the objects we have in view at our experimental farms is to find out what varieties of the different grains and fodder plants are the most profitable to grow.

As you are no doubt aware, the Dominion experimental farms form a chain from the east to the west. There is one at Nappan, Nova Scotia; one at Ottawa; one at Brandon, Manitoba; one at Indian Head, in the North-west Territories; and one at Agassiz, British Columbia.

During the past three years about fifty varieties of oats have been under test at each of these experimental farms. Much difference has been noted in the yield of these different sorts, some being much more productive than others, and a few have manifested their productive tendencies in all the climates of the Dominion. In the following table will be found the average crops from three years' tests at Ottawa of the best twelve varieties; also the results of the test for three years of the twelve varieties which have given the heaviest crops at all the experimental farms:

YIELD OF BEST VARIETIES OF OATS.

Three years results at Ottawa.			Three years results at all experimental farms.		
Variety.	Per acre.		Variety.	Per acre.	
	Bush.	Lbs.		Bush.	Lbs.
Banner	68	30	American Beauty	72	10
Golden Beauty	65	15	Banner	72	7
American Triumph	65	13	Columbus	70	15
Columbus	65	12	Golden Beauty	69	1
White Russian	65	..	White Schonen	68	7
Abundance	63	23	Early Golden Prolific	67	26
Golden Giant	63	15	Holstein Prolific	67	18
American Beauty	62	12	Improved Ligowo	66	18
White Schonen	61	28	White Russian	65	25
Improved Ligowo	61	18	Wallis	65	18
Bavarian	59	22	Bavarian	64	23
Wallis	58	13	Early Gothland	64	22
An average of	63	15	An average of	67	32

In this table I have presented just twelve of the fifty varieties which have been under test; and the lowest yielder in this lot has given 58 bush. 23 lbs. per acre, while the variety which stands at the lower end of the full list has only given 18 bush. 3 lbs. per acre. The range of difference in the yields of these grains thus varies to a very wide extent. The Banner oats, which stands at the head of the list at Ottawa, is, I think, the best yielding variety which has yet been tried in Canada.

Mr. JOSEPH GOULD: What about the Siberian oat?

Dr. SAUNDERS: Mr. Zavitz, the experimentalist at the Guelph college and farm, has had excellent results with the Siberian oat he grows, better than we have been able to obtain. Lately, however, I have found out by testing them that the oat which he has grown under this name is a branching oat while ours is a sided variety. We imported ours from Germany, while the variety grown at Guelph was imported from England. The Siberian oats from Guelph produced last year an excellent crop with us—nearly as large as the Banner, which they much resemble.

If we can induce farmers generally to grow only these better varieties of oats, the average crop for the whole country would be largely increased, which would bring a large gain to the farming community. An increase of one bushel per acre in Ontario on oats alone would increase the returns of the farmers of this Province from $700,000 to $800,000. The average crop for 1897 was 35.5 bushels per acre, and if the average could be increased to 40 bushels this would be a gain of over three million dollars per annum. We are working towards such advances as these in crop raising, and we want every farmer to do his part in this good work. Mr. Zavitz has done good work at Guelph, and we have also done much in the same direction at our farms—the Central at Ottawa and those in the east and west. Some of the varieties of grain commended are comparatively new to this country, but we are trying to disseminate them by sending 3-lb. samples to all farmers who apply for them. By carefully sowing and caring for one of these samples, and sowing next year the seed obtained, a farmer can have at the end of the second year sufficient seed for a large area. Last year the demand for samples was so great that over fifty tons of seed were thus sent to farmers.

Among fodder plants, the most important crop at the present time is hay. In 1897 there were 2,341,488 acres of land devoted to this crop in Ontario. Unfortunately, timothy and clover do not grow as well all over the Dominion as they do in Ontario, and in some districts other crops have to be looked for as substitutes. In the Northwest country many of the farmers have tried mixed crops of grain, cut green and cured as hay, various mixtures of oats, barley, pease, rye and wheat. One advantage of these mixed crops is that you can sow them after the seeding season for your main crop is over, and they can also be harvested and cured before the general harvest begins, which is very convenient. They make splendid crops for soiling, furnishing stock with that variety of food which they relish, and keeping up the flow of milk in cows at the season when pastures begin to fail.

The pea vine is rich in nitrogen and flesh-forming material, and furnishes a large amount of nutritious matter for animals. In the Northwest it is a very common practice to use oat sheaves to feed stock. These are passed through the cutting box, and the straw and grain are cut together. This makes a nutritious food, and where hay is scarce it is an excellent substitute.

A variety of grass suitable for hay in the Northwest has been found, which promises to give as good a yield there as timothy does in Ontario. I refer to the Awnless Brome grass *Bromus inermis*) The seed of this grass was first brought to the Central Experimental Farm more than ten years ago, in response to an order given to a Russian dealer in seeds at Riga. It thus came from a northern source and has proven very hardy. Brome grass has an advantage over timothy in its root system. The timothy plant often forms a crown at the base which protrudes above the surface, which cattle frequently destroy by treading upon. In the Brome grass the roots run a little below the surface and are thus protected. In the Northwest this proves to be a very early grass, and is usually four or five inches high before the native grass has made a start. I think it is likely to prove useful in Ontario, on account of its earliness and vigor of growth, and it makes excellent hay. A sample of a pound or so of seed will be sent from the Central Farm to any farmer who desires to test it.

One of the most useful of fodder plants is Indian corn ; it gives the largest amount of nutritious matter at the least cost, and when well matured and fed with bran and grain, together with a little oil cake or cotton seed meal, it makes one of the best rations for milch cows, and it is also good for beef cattle. A well balanced ration, with corn as ensilage as its basis, may be made as follows :

Corn ensilage	50	pounds.
Oat straw	5	"
Ground barley	2	"
Ground pease	2	"
Wheat bran	2	"
Ground oil cake	1	"
Cotton seed meal	1	"

The above ration contains about 6.8 parts of digestible carbohydrates and fat to one part of protein, and closely corresponds with the American standard ration for milking cows.

The value of fodder corn for feeding purposes depends on the proportion of digestible matter which it contains. This varies much at different periods of growth in the plant, the proportion increasing rapidly as the corn approaches maturity. In the following table, prepared by the chemist of the Experimental Farms, the proportions of water and dry matter in each 100 pounds are given, also the yield per acre and the quantity of digestible matter per ton and per acre. It will be noticed that when the corn reaches the glazing stage it contains nearly double the quantity of digestible matter which it has at the period of tassel ; and for that reason we should grow the varieties which are most likely to reach maturity :

COMPOSITION, YIELD AND AMOUNT OF DIGESTIBLE MATTER PER TON AND PER ACRE IN INDIAN CORN AT DIFFERENT STAGES IN ITS GROWTH.

Indian Corn.	Water.	Dry matter.	Yield per acre.		Digestible matter.	
			Tons.	Lbs.	Per ton.	Per acre.
	Per cent.	Per cent.			Lbs.	Lbs.
Tasseling	85.73	14.27	22	1,329	186	4,220
Silking	83 83	16.17	24	52	211	5,069
Early milk	80.34	19.26	22	1,806	257	5,873
Late milk	78.09	21.91	21	759	286	6,012
Glazing	74.01	25.99	21	1,154	339	7,308

In growing corn a variety should be selected which will so far mature as to reach the late milk stage, or what is known as the glazing stage—that is, a condition when the grain is solid, but soft—about the same consistency which is preferred in green corn for the table. You will notice in the table the variation in the proportion of digestible matter at the different stages of growth, a constant increase taking place until it reaches the glazing period. After that, and while the grain is ripening, there is a transfer of the nutritious elements from the leaves and stalks to the grain ; very little additional nutriment is formed in the plant, and while the grain grows richer the leaves and stalks become poorer. Hence the best time to cut corn for ensilage is at the glazing period. Corn which has been sown broadcast and is green and immature does not make good feed for cattle ; there is very little nutriment in it at that stage of growth. Corn should always be grown in rows or hills. If in rows, they should be about three feet apart, and the plants about six or eight inches from one each other. If grown in hills, let the hills be three feet apart, with only four or five kernels in the hill. In broadcasting there is a waste of seed, and the corn contains very little digestible matter. It is far better to sow it as directed and let it stand and mature, and put it into the silo, when, if desired, it can be kept over until the following year and used for summer feeding.

We have been trying the Thoroughbred White Flint corn at the Ottawa farm for the past five or six years, and although in some seasons it reaches maturity, at other times it fails to do so. It yields well, and in the western part of Ontario would, I think, give good results. The Giant Prolific ensilage also yields well, but is late in maturing. Among the earlier ripening varieties which can be relied on to come to maturity, we have the Champion White Pearl, Pride of the North, Sanford Flint, Longfellow, Compton's Early, and Angel of Midnight. These six sorts give us a good selection, from any of which a crop of well matured food may be produced. In the Province of Ontario, in 1897, the increase in the area of fodder corn was over 30,000 acres, and the increase in ensilage made over the previous year was about 720,000 tons. This shows very plainly that corn is rapidly becoming one of the leading fodder crops in this country.

In order to make a complete ration other material must be given with corn, so as to add nitrogenous matter, in which the corn is deficient. Horse beans and sunflower heads have been suggested as a good combination for improving corn ensilage in this respect, and with such mixed ensilage milch cows and steers may be fed, with the addition of a smaller amount of grain. The crops from one acre of corn, a half acre of horse beans, and a quarter acre of sunflowers, make a good combination if they each grow well.

Mr. JOSEPH GOULD: We cannot grow the horse bean with any degree of success around Uxbridge.

Dr. SAUNDERS: We have been fairly successful with it at Ottawa, and there are parts of Quebec and the Maritime Provinces where these crops can be raised, and in such cases they make a good combination with the corn. We tried last year an early variety of the Soja bean, which was quite promising. It grew about three and a half feet high and yielded at the rate of fifteen tons of green fodder per acre, the beans being well podded from top to bottom. This is the most promising bean we have tried up to the present time—although it may not be safe to recommend such a crop from a single year's experience.

Mr. REID: Have you tried the White Cap Yellow Dent corn at Ottawa? We planted it on the 1st of June, and it was fit to cut on the 1st of September.

Dr. SAUNDERS: That is also a good variety of corn with us.

Mr. JOSEPH GOULD: I have not found anything better than Compton's Early.

Dr. SAUNDERS: I wish now to refer briefly to some fodder crops of minor importance. We find Hungarian grass, which is one of the common millets, very good in some seasons. A crop sown on the 12th of May gave us two tons 380 pounds of cured hay per acre. The larger kinds of millet have not usually given us good returns, and they cannot be recommended as equal to the other fodder plants referred to.

Kaffir corn is sometimes recommended. This is a sort of non-saccharine sorghum, which has short stalks, only four or five feet high. It does not mature its seed with us, or come to that degree of perfection required to make good fodder. It is said to succeed well in the Southern States and in California, but it is of no value in Ontario.

The Jerusalem corn is another of these varieties of sorghum, which needs a longer season than we have to bring them to perfection.

Teosinte is a tropical grass which has its home in South America. It is not adapted to our climate. The most we can do with it at Ottawa is to bring it to a height of two or three feet, but it does not head out, and the small quantity of fodder it produces is poor and watery. It, also, may be dropped out of the list of suitable fodder plants for Ontario.

The Flat Pea (*Lathyrus sylvestris Wagneri*) is a deep-rooted plant, which is said to produce an abundance of fodder in dry climates. The seed has been held at a high price and it has not been much grown. We have tested it at Ottawa and in British Columbia, and have tried it on the plains in the Northwest. It has given us a fair degree of satisfaction in British Columbia and also at Ottawa, but it has not been a success in the Northwest. I doubt if it would be of much value to the farmers of this part of Canada.

We have also tried Prickley Comfrey, but have not found it of much value as compared with other fodder plants.

There is one plant that was for a time greatly extolled by some seedsmen under the name of Sacchaline. This is a species of *Polygonum* native to the Sacchaline Islands in Siberia. As a fodder plant it is coarse and harsh in texture, and we have found it to be easily injured by frost. Compared with other fodder plants which can be grown in this country to advantage, Sacchaline is of little or no value.

And here let me utter a word of caution. It is too often the case that farmers throw away money by paying high prices for useless things. When you see a new thing extensively advertised and said to be something wonderful, before you buy it write to the Experimental Farm and we will promptly let you know whether the thing is promising or not. It is our business to test all such new things, and we shall be glad at all times to give to any one who asks the results of our experiments in such matters.

Mr. N. L. Campbell: Do we lose $10.74 in value from the ground by taking off two tons of hay? Is that from clover or timothy? Does timothy exhaust the land more than clover?

Dr. Saunders: The figures given are the results of analyses of mixed timothy and clover hay. There is not much difference between timothy and clover as to the exhaustion of the soil. The timothy is said to take a little more phosphoric acid, while the clover draws on the soil more freely for potash.

Mr. Campbell: Does not a field of clover enrich the soil rather than diminish its fertility?

Dr. Saunders: When clover is grown for plowing under, it enriches the soil very much; it adds nitrogen, much of which is taken from the air; but at the same time it takes a good deal of potash from the soil, and if the crop is taken off and sold the soil is then a loser to some extent.

Mr. Campbell: Does cutting the crop for seed exhaust the soil as much as pasturing?

Dr. Saunders: I should think the soil would be more exhausted from producing a crop of clover seed than it would from the pasturing of the clover.

Mr. Campbell: A German professor claims that clover enriches the land more by letting it ripen than by cutting it green. It develops the roots and the nodules which gather nitrogen are larger.

Dr. Saunders: Possibly this may be so; but we have had good results from plowing the green crop under.

Mr. Campbell: Is corn of little value for dairy purposes until the ear glazes?

Dr. Saunders: I would not like to say that. In the early stages of its growth it is deficient in nutritive matter; but a change for cattle of green food of this sort may serve as a relish and help the animal to digest other and more substantial foods, just as we eat lettuce, radish and other similar substances and find them healthful, but would not like to depend on them as the main articles of our diet.

Mr. George Graham: What benefit is there in using plaster on land?

Dr. Saunders: Land plaster is a sulphate of lime, and contains sulphuric acid combined with lime. Where soils are deficient in lime very marked effects are sometimes had from the application of plaster. Clover, for instance, takes up a great deal of lime, and this crop is often benefitted by a dressing of land plaster. In many soils, however, there already exists a large amount of lime, and in some a superabundance. To such soils the application of land plaster would have little effect. I do not think that land plaster has any special effect upon the seed-producing power of alsike, as some claim, apart from making the plant more vigorous when applied to such soils as are deficient in lime. Every year we become more and more impressed with the value and usefulness of the clovers for plowing under to enrich the soil. If the farmers of this Province could be persuaded to sow ten pounds of red clover seed on every acre of their grain—wheat, barley and oats—it would not decrease the yield of the grain crop for the year, and when the grain was cut the clover would grow rapidly, soon making a mat of green growth which would average a foot or more in height by the beginning of October. It acts as a catch crop during the season, absorbing the elements ot fertility which fall with the rain, and takes nitrogen also from the air, and from these combined sources there will be found stored in the roots and leaves of the clover, as much nitrogen as you can get in ten tons of barnyard manure. Of course the clover does not add potash or phosphoric acid, yet its deep roots bring up some of these valuable elements from the lower depths of the soil —which most other plants do not reach—and thus makes them available. A dollar per acre spent in clover seed to be used in this way, is a good investment.

A MEMBER: Have you grown any rape in the spring as a catch crop?

Dr. SAUNDERS: We have not sown rape as a special catch crop. It is not as good as clover for enriching the soil; it does not gather nitrogen from the air as the leguminous plants do.

Mr. JOSEPH GOULD: We once sowed rape among oats and we had a bad time cutting the oats; and after we got the crop cut we could not bind it. We would never try it again.

Mr. BELL: As dairymen we should not recommend the growing of rape as a cattle food. If we feed rape to our cows, we shall not be able to sell our butter. Keep rape and turnips from milch cows.

Mr. KNIGHT: If clover is plowed in in the spring, instead of in the late fall, it is worth as much? If you leave the clover until spring, it may be so good that you will leave it for a summer crop; if not so favorable, it could be plowed under.

Dr. SAUNDERS: Where the winter season is unfavorable we have found that the killing effects of frost have a deteriorating influence on the fertilizing effects of the clover. But if your clover comes through safely, and you allow it to grow until the 15th of May, and then plow it under for a corn or potato crop,—the roots have got to a greater depth and brought up an increased amount of potash and phosphoric acid, the nitrogen also is increased and you have then the equivalent of fifteen tons of manure as against ten tons if plowed under in the fall.

A MEMBER: Does land plaster help the clover crop to fix the ammonia absorbed from the air?

Dr. SAUNDERS: There is not sufficient ammonia in the air to serve any good purpose in this respect; but the plaster fixes ammonia, and hence it is very useful in horse stables. It is also useful in scattering over manure piles if you are going to turn them over. It saves the ammonia from being volatilized and lost in the air, and retains it until put into the ground.

Mr. THOMAS ROBERTSON, president of the local cheese board, congratulated the Association upon the success of the Convention, and trusted that the farmers of the district would avail themselves of the valuable hints given by the various speakers. He was glad that the Government encouraged the Association by giving generous grants, and publishing the annual reports containing the splendid addresses and discussions presented at these meetings.

Mr. GEORGE McHUGH, M.P., also gave a few words of a complimentary nature regarding the work of the Association.

CLOVER AS A CATCH CROP.

Mr. JOHN GOULD, of Ohio, was loudly called for, and had to respond. After a couple of humorous stories, the speaker went on to say: I am frank to confess that this is one of the best conventions I ever attended. The general information has been of a most valuable kind, and is well worth remembering and carrying home. The great object of farming should be to retain the fertility of the soil. We have been digging up this fertility and selling it by the half bushel, and the result is that we have had to feed the land. We are cropping our land in an unwise fashion. We take the grain off most of our 100 or 200 acres, feed it in the barn, and put it on twenty acres, and the result is that the remainder of the land is getting poorer.

Somebody asked Prof. Saunders about the use of land plaster. It does not pay to put land plaster on the fields, but it does pay to put it in the stable gutters and on the manure heaps, and fix the ammonia which is there. The loss of ammonia in our stables is too common. That is why the tears run down your eyes when you step into some stables; in fact it is the only place where you can bring tears to some men's eyes. (Laughter). The use of land plaster captures that escaping ammonia. Road dust is just as good as plaster, and you can get it for nothing if the overseer does not capture you. (Laughter.) The liquid makes about 65 per cent. of value of stable manure, and the use of land plaster or road dust will enable you to save most of it by absorption. If you put manure in the open air when the first rain comes, away goes a lot of your nitrate of soda, which is worth about seventeen cents a pound.

We must rely more upon catch crops and clover to retain the fertility of our farms. They are better and cheaper than commercial fertilizers, for with the latter you are never certain of but one thing, and that is that you are enriching the railroads that carry them to you. Let us raise our own fertilizers, and enrich ourselves. I say "Amen" to Prof. Saunders' proposal to use ten pounds of clover seed to the acre of grain crops. If your corn land is now a stubble it is a very stubbly stubble, and by the time it is turned under in the spring a lot of valuable elements has been washed out of the soil—you will lose enough nitrogen and potash on an acre to grow sixty bushels of oats. If you had put in clover, as advised this afternoon, you not only retain this fertility, but you get more nitrogen—from the atmosphere—and you add humus enough to make the land richer than ever. As soon as your corn is cut, sow a bushel of oats and pease, and soon your fields will be covered with a crop of legumes that are almost as good as clover. When I came from home this week my field was almost as green as ever, and as soon in the spring as nitrates are elaborated I have pea roots ready to catch these nitrates. And while I am over in Canada working for you and for myself I have millions of little rootlets working for me. A crop of weeds robs the soil of its fertility, but a crop of clover does not. And besides it enables me to have some fresh clover to tone up the animals on. Clover and ensilage are each good for animals. We cannot afford to grow any of the starchy grains for feeding on the farm; ensilage, at the same amount of work and cost in raising corn, will go about four times as far. Bran is one of the best foods going for cows; every pound of bran is worth a pound and a half of oats. You have to go down town occasionally anyway, and it is just as well to bring back some bran with you. Do not fear scientific terms. You take these scientific terms from a physician, and swallow his medicine, and yet you get frightened when we use a few of these big words in agriculture. The word "telephone" does not now scare you; and you are not afraid to talk about the phonograph. These are scientific terms. The phonograph will tickle your ears; carbohydrates will tickle your pockets. My friends, let us be more practical than we have been, and let us also be more studious. Go home, and think more of your cows; examine them carefully; study them well. Weed the poor milkers out, and sell them to the fellows who do not believe in attending dairy conventions. (Laughter and applause.)

FINANCIAL STATEMENT.

The financial statement was read and adopted. (See appendix.)

REPORT OF COMMITTEE ON UTENSILS.

The committee on utensils and supplies reported as follows: "We have examined the model cheese rack exhibited by Mr. John Luvey, and think it worthy of a trial."

The convention, after passing votes of thanks to the press, the railways, and the Mayor and citizens of Lindsay, adjourned.

THE BANQUET.

On Wednesday evening a banquet was tendered the visiting members of the Association by the citizens of Lindsay. The affair took place in the Benson House, and reflected much credit upon the caterer. No liquors were served during the evening. The Mayor occupied the chair, and until a late hour wise and witty speeches were made by representatives of the various classes present. The hospitality of the people of Lindsay will not soon be forgotten by those who attended the convention of 1898.

BUTTER AND CHEESE ASSOCIATION

OF

WESTERN ONTARIO.

ANNUAL MEETING.

The annual meeting of the Butter and Cheese Association of Western Ontario was held at London, on the 19th, 20th and 21st of January, 1898.

The President, A. F. MacLaren, M.P., occupied the chair.

DIRECTORS' REPORT.

The Secretary, Mr. George Hately, read the following report:

Your Directors for the year 1897 beg to submit the following report:

Since we last met in convention in the city of Brantford a year ago, and as a result of the resolution of that convention, the Dairymen's Association of Western Ontario has amalgamated with the western portion of the Creameries Association of Ontario, under the name of Butter and Cheese Association of Western Ontario.

The Directors organized themselves as follows: Representatives to the Central Advisory Board: the President, Messrs. Pearce, Wenger and R. M. Ballantyne. Executive Committee: the President, Messrs. Pearce, Eagle, Wenger and R. M. Ballantyne.

The Directers held meetings on January 31st, February 1st, March 6th and October 4th, besides numerous meetings of the Executive Committee. Conventions were held at Milverton and Port Elgin.

On March 6th, the Secretary, Mr. J. W. Wheaton, having resigned, Mr. Geo. Hately, of Brantford, was appointed. With the change of the secretaries the duties and expense of the office were reduced, giving the Directors control of a much larger amount for other purposes.

At a meeting of the Directors on the 6th March, three cheese instructors were appointed, viz: T. B. Millar, Kincardine; Jas. Morrison, Stratford; Alex. F. Clarke, Stratford.

The object the Directors desired to accomplish, in making these appointments, was to reach as many factories as possible. That this object was accomplished is shown by the fact that the instructors were not only continually employed the whole season, but applications for their services were so numerous that some had to be refused on account of want of time and also for lack of funds.

The appointment of the butter instructor was left in the hands of the Central Advisory Board, who appointed Mark Sprague, Ameliasburg, butter instructor for the whole Province—each Association to pay one-half the salary, and the travelling expenses to be charged to the Association benefited.

Separate reports will be made to you by: (*a*) Representatives to the Central Advisory Board; (*b*) Representatives to the Industrial Fair; (*c*) Representatives to the Western Fair; (*d*) Representatives to the Provincial Fat Stock and Dairy Show.

It has been customary to make small grants out of the funds of the Association to these fairs for the purpose of furthering the interests of their dairy departments. You will be asked to consider whether, in view of the increased work of this Association requiring a larger amount of funds than we have at our disposal, these grants should be continued. Whether the grants are made or not, you are entitled to send representatives to these bodies as formerly.

The programme of the convention has been published in pamphlet form, and copies sent out to each of the members.

A committee on the "order of business" has been appointed, whose duty it is to call your attention to various subjects not especially named in the published programme. Among these are: (*a*) Sanitary conditions of the factories; (*b*) Development of the system of instruction; (*c*) The subjects for legislation; (*d*) Membership.

At the convention in 1892, the membership fee was reduced from $1 to 50 cents, for the purpose of securing a larger number of members from among the patrons. This question of membership should receive your earnest consideration. We would suggest that there be a special membership committee appointed, comprising one member from each factory district. It is evident that if the membership is to be large, it cannot be made so by securing the members only from those who attend the convention. Instead of there being a few hundred there ought to be not less than 10,000, if the work of the Association is to progress as it ought to do.

The Provincial Government has done well in assisting the Association; the patrons of the factories ought to do their share, and *will do so* if the question is properly placed before them at their annual meetings and at other times. Each patron of a cheese factory or creamery should become a member of the Association, at a charge of 50 cents per annum; no one would grudge the cost, but the power of the Association would be immensely increased.

If the numerous applications for instructors' services this last year proves that the lines then laid down by the Directors are correct, it also proves that the number of instructors is quite inadequate for the purposes of the Association. The territory to be covered and the number of factories to be visited require a largely increased staff of instructors.

If the managers of the factories will take this matter up and enlist the interest of the patrons in the scheme, the object can be accomplished even though it involve the appointment of three times four instructors.

The Legislature ought to invest your Directors with authority of the Board of Health, with power to appoint health officers. If such can be done, and each instructor were also appointed an officer of health, some of our cheese factories would soon cease to have the appearance they now have, either outwardly or inwardly, and a few of our cheese-makers would have to find other means of making a livelihood.

There are a few men who require the visits of a sanitary officer. Such men have no use for the Association instructor.

All of which is respectfully submitted.

A. F. MacLaren, President.

The report was, on motion, adopted by the Association.

REPORT OF INSPECTOR MILLAR.

J. B. Millar, Inspector, then read his report as follows:

I take pleasure in presenting to you my seventh annual report. There was assigned to me Division No. 1, comprising that part of Western Ontario north of the main line of the Grand Trunk Railway from Sarnia to Toronto, and as far north as the Georgian Bay, which is enough territory and factories to keep three men busy, that is, if they were to visit all the factories, which should, I believe, be done at least three times during the season, and which would repay largely any expenditure that it might entail. There are one hundred and fifty-five factories in Division No. 1. I received applications from forty-four and had to decline ten of these, as I could not visit them at the time they wished my services. I visited thirty-four factories, making in all one hundred and twenty-eight visits, most of the time being devoted to giving instruction in cheese-making only a few days being spent at milk-testing.

I commenced my duties, along with the other instructors, at Bright factory, on the 28th April, and we spent three days there gathering all the information we could and getting ready for the work of the season. Then one day each month was spent together comparing notes in the following factories :—Tavistock, Black Creek, Thames (near Nilestown), and Strathallan. I take this opportunity of tendering my thanks to Messrs. Johnson, Bell, Barr, James and Bothwell for their assistance and kindness to us during these visits. Having the northern division, the factories were not opened as early as those farther south, consequently I was not very busy during the month of May, but during the balance of the season I had more work than I could attend to.

I received applications from, and made regular visits to, 11 factories in the county of Perth, 1 in Middlesex, 5 in Huron, 5 in Bruce, 4 in Grey, 1 in Simcoe, 1 in York, 3 in Wellington and 3 in Waterloo. Most of the factorymen asked for four but some wanted five visits.

I tested 2,206 samples of milk with the Quevenne lactometer and 671 with the Babcock tester. The richest sample that I tested showed 4.6 per cent. butter-fat and the poorest 1.2 per cent butter fat. Four samples tested between 1 and 2 per cent., 46 between 2 and 3 per cent., 575 between 3 and 4 per cent. and 46 between 4 and 5 per cent. butter-fat Samples of milk taken from the vats during the months of May and June tested from 3.2 to 3.5 per cent. butter-fat ; July and August 3.3 to 3.7 per cent. butter-fat ; September and October 3.6 to 4 per cent. butter-fat.

Five of the factories that I visited were paying for milk according to quality, and, as far as I could learn, the patrons were well satisfied with the system. I hope to see the day when every cheese factory and butter factory in this Province will pay for milk according to quality. Eight patrons were fined for tampering with the milk. They all pleaded guilty and were fined from $5 to $15 with costs. I am sorry that the fines are so small, but in most sections it is almost impossible to get the Justice of the Peace to go over the $5. In one case the J. P. fined the party $10 and costs, and in a few hours he repented and changed the fine to $5, as he did not want to be hard on the "poor fellow." Of these cases two were in the county of Huron, one in Bruce, one in Grey, three in Wellington and one in Waterloo.

Out of the 82 tests that I made of thermometers, only 36 were correct. Some of them were as much as 4° and 5° out, 14 of them being too high and 32 too low. This shows the necessity of having at least one thermometer that is correct and keeping it for testing the others in use. I would recommend one with a 10 inch or 12 inch metal back which will cost from $1 to $1.25 each, to be used only for testing the others in use.

Fourteen of the factories that I visited fed the whey at the factory, and 20 returned it in the milk cans to the patrons. Of this system of returning the whey in the milk cans I have not a good word to say, and the more I see of it the less I see to admire. It is the *evil* of the dairy industry to-day, and always will be until it is stopped entirely A large percentage of the whey tanks are positively *dirty*. I have recommended that the whey tanks should be emptied and cleaned at least once a week, the best time being on Saturday morning immediately after the milk drawers have taken all they want. By attending to this properly the tanks and whey can be kept in much better condition than they have been formerly. The cheese-maker has not time to do this. In some cases one of the patrons takes all the whey that is left and cleans the tanks for it, the cheese-maker supplying plenty of hot water and seeing that the work is properly done I have succeeded in getting several factorymen to adopt this plan, and much better results have been obtained.

In this age of enlightenment one might expect that patrons would at least strain the milk before sending it to the factory, but in almost every factory you will find a few careless patrons who do not.

To make the quality of cheese that is demanded, we must have better milk; this we must get through the medium of the cheese-maker, and as long as he will accept dirty, bad-flavored milk, just so long will some of his patrons send it to him. He must exercise good judgment in selecting milk, and a strong determination to reject all milk that will not make a first-class article of cheese. A number of cheese-makers in the past have accepted milk that they knew they should have rejected, and many of them know too well the result of such folly. Again, we find patrons sending milk in old rusty cans not fit for dairy purposes, milk coming in such cans should be rejected. I would say to you, cheese-makers, you have the power to rectify these things in your own hands; make up your mind to what is the right thing, then go about it in a judicious manner and you shall gain your point.

I am sorry to report that the sanitary condition of a great many factories is far from being what it should be. In fact some of them are so bad that it is really alarming—poor floors and no drainage whatever, with pools of rotten whey under the factory, enough to create a disease. In such case the curds are exposed to the worst forms of bacterial life, and who can tell what the result may be; and as far as I am aware there is little or nothing being done to better the existing conditions. I would urge upon the directors of this Association to do their utmost to have sanitary inspectors appointed for the coming season, with power to close such factories until they are made right.

I would recommend factorymen to put ice racks in the curing-rooms, and to use ice during the very hot weather. By doing so they will save money, as well as the quality and reputation of their cheese. Also to provide some better method of heating the curing-room. The best method I know of is the hot air furnace "Alaska" (described by Mr. R. M. Ballantyne in last year's report, page 93). I recommended it to the manager of a factory in my division. He put one in, and he was so well pleased with it that he wrote me, saying, "The furnace works like a charm—so well that two of the neighboring factorymen talk of putting one in each of their factories." These furnaces keep a uniform temperature throughout the room, and are not hard on fuel. During the past season I found the temperature in the curing-rooms verying from 50° to 90° and the moisture from 35 per cent. to 70 per cent. The right amount of moisture is about 60 per cent.

The Association has been doing good work, and, to my knowledge, the work of the past season has given better satisfaction than ever before. I would urge upon the directors the necessity of engaging more instructors, and of making the divisions smaller, thereby enabling the instructor to spend more time in the factories and less in travelling. Several of the factorymen in my division signified their intention of making application to the Association for the service of their instructor for the coming season. As I said before, I think it would be a good thing if every factory in the Province was visited by an instructor at least three times during the season.

I would like to see the Association carry on some experimental work in cheese factories during the coming season. Have one of the instructors spend at least ten or twelve days in a factory, and, with the maker, carry on some work as they might be directed by a committee of competent cheese-makers or manufacturers, or under the immediate direction of the Association.

I take this opportunity of thanking the officers of this Association and dairymen for their kindness extended to me during the past summer.

I am, your obedient servant,

T. B. MILLAR.

Kincardine, Jan. 19, 1898.

NOTE.—Since preparing my report I noticed in *Farming* of January 4th., 1898, an article headed "Sanitation in Cheese Factories and Creameries," from which I take the following extract: "Some weeks ago an official representative of one of the British agricultural organizations visited Denmark and brought back the startling report that fully fifty per cent. of the Danish dairies were conducted without any regard to the sanitary conditions whatever. It will take years for Denmark to recover from the effects of the report. Canadian dairymen should be watchful lest a deputation of the same character should visit Canada and, instead of visiting some of our best equipped and best appointed factories, as we would like, drop in on some of our older factories where the sanitary conditions are not what they should be, and report accordingly."

THE PRESIDENT'S ADDRESS.

By A. F. MacLaren, M.P., Stratford, Ont.

Ladies and Gentlemen: I am very much pleased to be able to say ladies, although there are few here. I think if we had more ladies in connection with our dairy business we would see better dairymen. We have just passed through one of the most notable years in this nineteenth century. Eighteen hundred and ninety-eight is now here, which means that the twentieth century is near at hand. Eighteen hundred and ninety-seven, the Queen's Diamond Jubilee year, has been celebrated by the dairymen of this Dominion, the greatest of the Queen's Colonies, by making it the banner butter and cheese year in the history of the trade in this fair Dominion, and I feel that I am safe in stating that I voice the sentiments of every member of this Butter and Cheese Association when I say that we as dairymen are all proud of, true and loyal to Her Most Gracious Majesty Queen Victoria, and we, with one voice say "Long may she reign over us, God save the Queen." (The audience here rose and sang "God save the Queen.")

While addressing you last year in Brantford, as President of the Dairymen's Association of Western Ontario, I told you that if arrangements were carried out for the purpose of amalgamating our Creameries Association with our Dairymen's Association, you would at this meeting be addressed as members of the Butter and Cheese Association of Western Ontario.

The Canadian Dairymen's Association was first organized in 1868, and the first meeting held in the town of Ingersoll with the dairymen's good friend, the late Mr. C. E. Chadwick, as President. In 1877 the name was changed to that of "The Dairymen's Association of Western Ontario," and continued under that name until last year, when it was again changed to that of "The Butter and Cheese Association of Western Ontario." During all these years the great cheese industry has gone forward with leaps and bounds.

I feel that we have done a good work in joining hands with the Butter Association, as winter dairying or winter butter-making is so closely connected with our cheese industry that I think it will be the means in a very short time of at least assisting in placing our Canadian butter in as prominent a position in the markets of the world as that which is held by our cheese to-day. It is marvellous to note the many cheese factories which during this past fall and winter have been converted into creameries for the purpose of making butter through the winter months, and the time has arrived when we require a new class of dairymen—a combination man—one who can make good butter during the winter and good cheese during the summer. This will give the combination man employment all the year round, and I might say that he will be known as the new dairyman, or the combination man; and right here and right now I would advise that every good cheesemaker who intends to remain in the dairying business should lose no time in learning how to make butter and how to make and handle it well; and if he does not make up his mind to do it right and do his work well, I would further advise that he drop clean out of the business, as the time for employing careless, indifferent untidy cheese or butter makers has gone by. The time has arrived when we must have good men in our butter and cheese factories. None but the good men need apply if we, as Canadian dairymen, want to stay in the race and keep to the front.

Now, with regard to the work which our Butter and Cheese Association has been doing, you have heard the Report of the Directors, and I shall not take up much of your time in commenting on what we have done, but I shall briefly look over the report and then make a few suggestions as to where I think improvements must be made in the future.

Messrs. Millar, Clark and Morrison were the three chesse instructors and inspectors employed by the Association during the past year, and I am sure they all did good work for those who employed them, and I am sorry to say that more of our large factories, which are working on the co operative system, did not employ our instructors to as great an extent as those who owned private factories did. It is very discouraging to those of us who have the directing of the instructors and inspectors that when we ask some of these large companies to employ them they reply by saying something to the effect that they have employed a first-class cheesemaker, who has guaranteed to make a first-class article, who has agreed to be responsible for any inferior goods, and that they were not going to engage a man to instruct him. I hope this matter will come up for discussion, as I think it is high time the cheesemakers were beginning to realize that many times they have been made responsible for inferior goods when no cheesemaker under the canopy of heaven could produce a fine article of cheese from the milk supplied them, as sometimes the weather is such that it is almost impossible for every farmer to supply good milk, and I think there should be some system whereby the blame, if any, should be placed where it belongs. (Applause.)

Mr. Sprague, our butter-making instructor and inspector, has done very good work, but I think he should be employed both winter and summer, as there are many more butter factories in operation during the winter than there are during the summer season, and as the butter industry is advancing so rapidly, if we want to keep pace with the times we must employ more instructors; and the great question which is now staring us in the face is, how are we going to, as butter and cheese men, raise money enough to pay those who should be employed, which would be at least ten cheese inspectors and instructors, and as many butter inspectors as would be required to do the work efficiently and well throughout the whole of Western Ontario?

The Government has been assisting the Association for the last number of years very liberally, and I hope that the Hon. Mr. Dryden, our Provincial Minister of Agriculture, will still increase our grants. At the same time I see no reason why there should not be some system in connection with each cheese and butter factory throughout the whole western country whereby each patron of each cheese factory or creamery would be asked to pay at least twenty-five cents per year. If such were the case we would then have a large fund and be able to employ more instructors and cover the ground more thoroughly, as the number of instructors we now employ is altogether inadequate to cover the ground thoroughly, and with the funds which we have at our command it will be an impossibility to do any better work or any greater work in the future than we have been doing in the past.

I feel that this is a very important matter, and one to which every person who is connected with the dairying business should give very serious consideration, and the factorymen of this country should take the matter up and devise some system whereby funds could be provided to push on this good work and spread the gospel of better milk, better butter, better cheese and more money.

I also feel that the legislature should by some means invest this Association with authority to have each of her instructors act as health officers, as some of our cheese factories are in a very unhealthy, filthy and deplorable condition, and I feel that if our instructors had this authority you would soon see a great change in the condition of many of our factories.

Now, I do not wish, as president of this Association, to take up too much of your time, neither do I want to say anything which may interfere with the papers that will be read by our inspectors and instructors, but as I have travelled during the past year from ocean to ocean, seeing so much butter and cheese in one way and another, I cannot afford to close without warning this Province that the other Provinces in the Dominion, also the United States and New Zealand, are watching us very closely and pushing very hard to secure a similar position in the markets of the world to that which we now hold.

It is all very well for those of us who are engaged in the dairying business in Ontario to sit down calmly, fold our hands, allow our heads to become swollen, thinking we have done everything that can be done, saying to ourselves "We are the people; we know it all. We ship sixty per cent. of the cheese which England imports; we are getting along nicely with our butter factories; and we are now shipping sixteen to seventeen millions of dollars worth of cheese every year from Canada. We are the people." I say to the patrons, to the cheese and butter makers, to the dealers—to everyone who is engaged in this butter and cheese industry—this will not do. We must not sit idly by, we must go on and keep kicking the ball if we want to stay in the race. Someone asks what can we do to improve. In reply I can say, we have our instructors and inspectors; we have our agricultural colleges and our dairy schools; monthly bulletins are being sent broadcast among the farmers, butter and cheese makers; we have our Babcock milk testers, our first-class cheese factories, our first-class combination factories for butter in the winter and cheese in the summer; we have all the education and every facility necessary for the manufacturing of good butter and good cheese; and if we only apply ourselves we will keep to the front and have no trouble in holding our position, and still improving it in the markets of the world.

We in this part of the country should think more seriously of what the grand old cow is doing for us, and to-day our chances are greater than ever, with all the advantages we have as compared with twenty years ago. Even in those days I believe dairying was the very salvation of the farmers who engaged in the business; while to-day they have a chance to do with one acre of land and with one cow what they did years ago with two acres of land and two cows. What has done all this? I answer that education has done it. And still to-day you will hear farmers, butter and cheese makers and cheese buyers say: "Oh, what is the use of the dairy conventions? What good are farmers' institute meetings? What good are the dairy schools? What good are the agricultural colleges? What good are the bulletins? What good are the instructors and inspectors?" Some cheesemakers will say: "Oh, I knew that instructor when he was only a cheesemaker; he can't tell me anything." One man said to me "I knew that instructor when he was a milk-hauler"; and he thought he could not be an instructor because he once hauled milk. Others will say: "What is the use of attending all these meetings. It is the same old story." But all the same I point you to what the dairying business was years ago and what it is to-day; and I repeat that those conventions, dairy schools, instructors, inspectors, colleges and all this education place us in the position which we hold in the markets of the world to-day. What we want is still more education. I will show you in a few moments where it is necessary to start right now and remedy a great many evils which still exist. We have done well and have accomplished wonders, notwithstanding all the competition. We have a reputation of which we should all feel proud—as patrons, as cheese makers, as butter makers, as cheese and butter buyers—and which all classes of the community should do all in their power to maintain.

When a farmer has a herd of cows, all of which he knows to be good, it is in his hands to feed them the proper kind of food, supply them with plenty of water, give them all the salt they require, and good pure food which will not taint the milk. He can keep them in comfortable stables, milk into tin pails, and see that the hands of the milkers are thoroughly clean. He can also strain the milk into the big milk can, he can aerate and cool the milk and keep it in a very pure atmosphere; he need not leave it in the barn-yard over night inhaling all bad odors, nor leave it standing in the morning sun. In fact all these small details should be attended to and the milk supplied to the cheesemakers in the very best possible condition. If you attend to these little matters yourself and see that your neighbors do the same, you will do better work all round than at the present time it is being done. I would advise all who have not given the matter much thought or consideration to see to it now that all the cows they have are good ones. With all the knowledge and skill you possess you should do better. You are all intelligent people; think what you are doing; think what milk, cheese and butter are doing for you.

Think for one moment that you could do better by that grand old cow in the future than you have done in the past; think what a good friend she has been to you. As soon as you begin to think seriously and realize what she has done and is doing for so many of us, then you will realize, probably for the first time in your life, what a grand animal that magnificent old cow is, and if you but treat her well and give her a fair show she will make money for all of us, and make comfortable homes for us all. Get the right kind of a cow and treat her well; you push the button and she will do the rest.

I have told some of the things you could do. Now I want to tell you of how we can still go on and improve and I shall only suggest a few ways. In the first place, I think the dairy farmer should go and see more of how his neighbors do their business. He should go still farther, and see for himself the best dairy farms in America; he should see the best herds for dairy purposes; he should see the best buildings, the best stables and barns, and, as I told you before, he should have a Babcock tester and a pair of scales, when he could weigh the food consumed and the milk produced, thereby ascertaining the cost of production, knowing exactly "where he is at." My idea is, that the grand old cow should be used and treated almost as well as if she were one of the family. She should have every comfort shown her; a good warm stable, plenty of fresh air and lots of sunshine. The stable for the cow is very much neglected, and this is one place where we can improve very largely all over this Canada of ours. This is one point we could gain,—by getting better ventilation, more light, more sunshine and more pure air.

Give more air, more light in your stables and more sunshine for your cows, and they will give you better and purer milk, butter and cheese, and more money for your work. I have gone into stables where the cows were breathing very impure air, enough to kill them. I have even gone into stables where it was so dark you could scarcely find the cows. I have often found them dirty and filthy enough to kill the poor animals. On the other hand, I have found stables clean, neat and tidy, with lots of pure water, pure air, lots of sunshine and everything in its place. What we want is to have all the barns and stables in good condition and when we accomplish this, people will stop wondering why it does not pay better to keep cows and why they have badly flavored goods which they cannot sell.

Now, with regard to boxing cheese, I think it is a shame and a disgrace to find that in hundreds of factories fine cheese are allowed to leave the factory in anything but a desirable condition, In some cases, the cheese is from one to two inches above the box; in other cases, the box from one to two inches above the cheese; sometime no scale boards on either end; sometimes one on one end and none on the other; sometimes the scale board will be found on the side of the cheese, when it should be double scale boarded; or two scale boards on each end of every cheese. The cheese should be the exact fit for the box, and every cheesemaker should see that his cheese is put up in this way. If he wants to retain his position he must do this work right. I have found the boxes very often made from miserable, cross grained, brittle timber, with a narrow thin band around the bottom of the box, instead of having the box made of good timber in the first place, with a good wide thick band at the bottom and a deep lid with good timber for the top. Again, where a buyer or inspector has culled out a few cheese in a factory, and it has been arranged that they be left there, you sometimes find them to be the first cheese the lid will tumble off when they are rolled into the car. This should not be the case, as it is sometimes necessary to go through the whole lot of cheese to find the few bad boxes. Anyway, there should be more honesty and straightforward dealing, as it is not right to try to foist cheese on a buyer which are inferior in quality and goods he did not buy. It only comes back, and is finally much more detrimental to the cheese factory than if the cheesemaker had allowed those poor goods to remain in the factory.

I also find that a great many cheese are allowed to crack on the tops and sides. This should not be allowed, and by proper care it could be overcome. Show me cheese that are cracked on the tops and sides and I will show you a careless cheesemaker, that is, provided he has the proper appliances for making cheese. Again, I find many factorymen who allow beautiful, well made, well boxed cheese to be hauled to the station during very heavy rains, with wagons all muddy and getting boxes all dirty, rain going through to the cheese causing them to look very unsightly. I think it is high time the factorymen were supplying covers of some kind so as to prevent the rain, mud and dust from injuring the cheese during the summer months, also to prevent the hot sun from causing them to become overheated.

I might go on talking to you about troubles of this kind for hours, but I shall not detain you much longer. Put thought and skill into your business ; be close observers. If you are a patron of a joint stock factory and a shareholder, you are a manufacturer, you have a right to visit your factory, you help to pay the cheesemaker. I advise that you visit the factory often, that you see how the cheesemaker is conducting himself, and that everything all round your factory is clean, neat and tidy. See that his fences and gates are all right, as you approach the factory. See that no weeds or trash of any kind is growing up around the factory, and that no pools of whey or filthy water are lying around. See that no hogs are allowed near the factory, and that no pools of whey are allowed round the whey tank. Do not allow whey to go back in the cans. See that your cans are always kept fresh and clean. As soon as they begin to rust, so that they cannot be kept clean, it is time to get a new can. See that your wood pile is neat and tidy, and properly piled up, and also that engine and boiler also the room in which they are kept, are kept clean and tidy and shining like a new pin. Examine the milk cans, milk stands, weighing cans, scales, conductors, strainers, vats, curd sinks, floors, gutters, presses, curd strainers and curd knives, and see that everything in the making room is clean and neat as it would be at home. I may say right here that I think a great many of our cheese are injured in flavor by the curds being allowed to lie in curd sinks and on curd strainer cloths which have not been thoroughly cleaned, scoured, scalded, aired and ventilated.

Now we go on to the curing room : Here see that all the cheese are the same size, with no mold on them and no rust or cracks on the sides ; no wrinkles in the bandages, no lob-sided cheese, no shanty roofed cheese, no sour cheese ; no dirty shelves ; no piles of boxes in one corner, barrels of salt in another corner and broken cheese boxes in another, with scale boards, shaving off boxes and stove pipes rusting in another corner. Permit no crooked shelves, dirty floors, broken windows, or anything that you may see untidy. Every stockholder should see to these things himself, and when he sees any of the above named things imperfectly done he should make a complaint to the directors, and find out the reason why his milk, if it is good milk, is not being made up in the best possible manner. If every patron of the cheese factory will do this, then I will show you better butter, better cheese and better prices. But I am sorry to say that I can point to hundreds of farmers at the present time who are sending milk to factories which they are seldom, if ever, in. If they would sit down and think for a moment of what a Klondike the grand old cow and the dairy business would be to them if they handled it properly ! We must go on and push hard if we want to get through doing any kind of business during the present age, as competition is so great and the eyes of the whole world are upon us. The United States are after us hard for a place for both butter and cheese in the English markets ; so also New Zealand. And in our own Dominion I may say that in every Province they are working night and day to get a similar position to that which we now occupy. I know whereof I speak, as I have been in all the Provinces during the last few months. I shall not go into details just now, but may speak of what I have seen sometime before the convention closes. Before closing, however, I would like to give you a few short suggestions, or say a few things to you who are engaged in the dairy business, to carry home with you :

Don't allow your milch cows to eat turnips.

Don't allow your milch cows to drink impure water.

Don't allow your milch cows to go without salt.

Don't allow your milch cows to eat apples or refuse from the cider mill.

Don't allow your milch cows to eat rape or rye.

Don't allow your milch cows to be abused, whipped, run by dogs, or excited.

Do not allow milkers to milk with dirty hands.

Don't milk in a filthy or dirty stable.

Don't leave your milk standing in the stable or barnyard.

Don't allow your milk to stand in an impure atmosphere.

Don't milk into wooden pails.

Don't allow your milk to stand in the hot sun.

Don't mix hot and cold milk together if you can avoid it.

Don't allow your cans of pure milk to be placed on a dirty, filthy wagon.

Don't allow whey to be taken home in your milk cans.

Don't have a pig pen under your milk stand.

Don't draw cheese to the railway station in a dirty, filthy wagon—one which has been hauling manure the day before.

Don't allow your cheesemaker to buy second-hand supplies.

Don't pay him such poor prices that he is obliged to use inferior goods.

Don't allow him to buy poor salt, poor rennet, poor bandage cloth, poor coloring, or anything poor; get him the best supplies and make the very best cheese.

Don't allow him to keep a dirty, filthy, slimy factory.

Don't allow him to go around with dirty clothes, dirty pants, and dirty aprons which will stand alone.

Don't allow him to neglect curing his cheese, see that he keeps the fire on in curing room in spring and fall and at the proper temperature.

Don't allow your cheese to leave the factory an inch or two above the box.

Don't allow your cheese to leave the factory with the box above the cheese.

Don't allow your cheese to go to the railway station in the rain.

Don't allow your cheese to leave the factory uncovered.

Don't allow anyone to put in cheese which were left out by the buyer.

Don't allow anyone to box the cheese, unless the cheese-maker or someone who knows is there to see every cheese is boxed right.

If you carry out all the above "Dont's" you will win. "Keep the light in front of you and the shadows will fall behind" (Applause.)

Mr. McFarlane: If you want to churn easily, do not feed your cows salt.

Mr. J. W. Scott: I was not here to listen to all your address, but I noticed you said we were not to take cheese to the station on a rainy morning. If we have orders to take the cheese to the station at 11 o'clock in the morning, what would you do?

The President: You should have covers to cover the cheese, and protect them from the rain. If I had ordered this cheese, I would much rather you would keep it home than bring it out in the rain and injure it, but if you had covers to cover them up you could bring them in.

Mr. Derbyshire: All you want to do is to buy some strong cotton and paint it; you can do it yourself, or buy it from one of the dealers who sells dairy goods. There is no doubt they are essential. Even if it is a fine day, it is better to keep your cheese covered, as it protects them from the sun and dust; and then if it should rain after you leave the factory and before you reach the station, you can protect your cheese from the rain and deliver it at the station in first class condition. I am delighted with the address that has just been given by the President. There are a great many valuable suggestions in that address. There is no doubt that if we would pay some attention to this address, and put some of the points into practical operation, we would improve greatly in the manufacture of fancy cheese. It is important that we make fancy cheese in 1898. It is important that we should take another step in advance, and walk right away from our competitors, and we are the people who can do it. We are the people who have always done it in the past, and we are going to do it now. (Applause) During the past year I have been talking of these dirty wagons for delivery of milk. Milk is most susceptible to any kind of foul odors, and it is very important that we should have clean wagons and clean men, and clean cans, and horses in the best of shape, and the harness clean, and show that we are doing our best to deliver this milk to the factory in the best condition. There is no doubt that if all connected with the business are doing their best, it would warm the heart of the maker, and he would do his best. Then, if the maker has on these pants that will stand alone, strip them off him. If there is any one distressing thing in the world it is to have a man in charge of the factory who will not clean himself up, and yet expecting that he is going to have farmers deliver their milk in fine condition. If the cheese maker is bright and clean, and his dress is clean and tidy, he can tell patrons to clean things up. I have seen butter from this section this year that had that blessed (or cursed) turnipy flavor, and it destroyed the profit. They tell me that Scotchmen and turnips grow right up together. I tell you you want to feed these turnips to something else besides the milk cow. We must have fine butter and cheese, and you cannot make fancy butter that will sell for the first price, unless you have a fine quality of food. Turnips will destroy the flavor ; and when you know these things, why will you persist in feeding turnips? The Directors' report spoke of the hearty co-operation of the people of the Province of Ontario with the Dairymen's Association. What is the use of only five or six hundred members belonging to these Associations, and expecting them to have the power it ought to have in this country. We need money to carry on the work in the first place. If we had 10,000 members in this Association, and 10,000 in the Association in the east, and if we went to either Government asking for anything, with 20,000 solid men behind us, we would then have an influence that we have not to-day, although we have had big influence in the past. We built these Dairy Schools, we appointed the Minister of Agriculture for this Province. All know the good old days when the Minister of Agriculture was the Treasurer, with the Commissioner of Agriculture shoved under the desk and never heard of in the world. But now we have the Minister of Agriculture responsible to the people of this country. We have made the butter and cheese what it is to day on account of the work done by us, and I say it is only fair to this Association that 10,000 men should furnish their fifty cents and go right forward, and show by their co-operation and sympathy that they approve of the work that is being carried on by this Association, and if you do that you will be a step in advance in 1898 that has never been attempted in the past. What would you do without the $20,000,000 that is being brought into this country from the butter and cheese that is sent out? We can make it $25,000,000 in 1898, providing you carry out the programme laid down by your President. How are you going to get the best milk to the factory from animals that are not healthy? And animals will never be healthy in a place where the sunshine never reaches, and where there is no ventilation. Every factory ought to buy five or six wagon covers, and have them on hand so that when the cheese is carried to the station it will be delivered in good shape, and the covers can be brought back to the factory and hung up after being carefully dusted off. You can get these covers from dealers, and they cost only $2.50, with rings and everything to tie them up. It will give your factory a better name, and show you are enterprising. (Applause.)

J. A. GRAY : I might say a few words regarding these covers. It rained this spring when we were delivering our cheese. The buyer complained about the boxes getting wet, and said that if it occurred again he would have to make a reduction on the cheese. We bought about three webs of cotton, and got it oiled and made covers for the waggons. They did not cost quite as much as Mr. Derbyshire says I think the price was somewhere about $1.75 apiece, making and all. This fall when we sent off our September cheese, we shipped them on one of the wettest days we had this fall, and we delivered them at the station, and there was no complaint. We have twenty covers, and they are owned by the factory, and they are kept at the factory, and put on the waggons after the cheese is loaded.

The PRESIDENT: I know about that shipment of cheese. They came in a terrific rain storm, and I asked the buyer if they were affected by the rain. He said "No, they were covered." I know another case where the cheese came in the same day, and they were not covered, and the boxes not properly shoved down, and that factory lost one-half cent per. pound.

Mr. DERBYSHIRE: That one-half cent would buy covers for twenty years.

Mr. T. D. BARRIE: How are we going to avoid these patrons coming with dirty, filthy waggons? The President spoke of hundreds of patrons who never saw a cheesemaker. There are hundreds of them go to the door and say "Load me up," and they have the dirtiest waggons you ever saw. I think there should be some rule laid down that no man should be allowed to bring in a waggon to the factory unless it were clean and tidy. This summer we shipped some cheese, and Mr. Riley met our salesmen and said, "Why did you send out this cheese in that way? The cheese were so dirty that you could not brand them."

A MEMBER: The President spoke about drawing the whey back in the milk cans. Could you suggest some plan of getting it back without using the milk cans?

The PRESIDENT: Send the hogs to the factory and feed them there.

Mr. KEILER: What objection is there to feeding rye?

The PRESIDENT: We claim it flavors the milk, the same as turnips, to a certain extent. I do not know that I have found it myself.

Mr. MILLAR: If you feed it dry and hard it has a certain flavor.

Mr. KEILER: I grow rye to pasture.

Mr. MILLAR: If it is pastured while it is green we have never had any bad results from it, but sometimes you see rye that is almost in head and cattle pasturing on it. In such cases we get strong flavor from it.

A MEMBER: I think you will get the taint from rye no matter whether it is green or not. The flavor of rye always puts me in mind of the flavor of fish. I think the flavor works out; we do not find it in the cheese, but in the milk it is quite strong.

Mr. MILLAR: Still you have not had cheese rejected for having flavor of that kind:

Mr. J. W. SCOTT: I never had any cheese rejected on account of rye flavor, but I had cheese one time that I thought ought to be rejected. The buyer said "There is some kind of flavor here; I do not know but what it will go off." I traced it to rye. I prefer he patrons not to feed rye.

The PRESIDENT: How do you account for so many cheese not having proper boxes

Mr. BARRIE: It is really too bad to see how some cheese are put up. Some factories go around to two or three firms to see where they can get the cheapest boxes, and they get the boxes made from very light poor stuff. I remember going to a place where there was six or seven hundred boxes of cheese, and I believe every cheese was an inch above the box.

The PRESIDENT: How are we going to overcome that difficulty?

Mr. BARRIE: Cut them in price till you get it right. I think the buyers are a lot to blame. If they would go for the cheesemaker, the cheesemaker would go for the patron. We used to make poor cheese, but you cannot do it to-day.

Mr. BLACKMORE: I would like to ask what are the chief reasons for so many mouldy cheese, and how to avoid it?

Mr. MILLAR: It is caused by either too much moisture in our curing-room or in the cheese. Get your curing room ventilated properly and you will not have mouldy cheese. You have a new factory, Mr. Blackmore, and I suppose that will have something to do with it.

Mr. LOCHEAD: Mr. Millar has referred to the testing of milk and the desirability of paying for milk according to the value. I am thoroughly in accord with paying for milk according to the value. Our factory has adopted that system for a number of years

I am of the opinion that to pay for milk simply according to the Babcock test is going to extremes, that is for cheese-making. For the last number of years at our factory we have paid by adding two per cent. Milk throughout the season averages about 3 70, or 3.75 per cent. of fat. A hundred pounds of that milk will make about nine pounds of cheese. This shows that there are ingredients that come from milk to make the cheese other than butter fat. We allow two per cent. for these other ingredients, but I hold it is scarcely enough. There is quite a margin between 3.75 of fat and 9 per cent. of milk in the cheese. As well as fat, there are casein and other ingredients in cheese. I would like to know if any experiments have been made to show that two per cent. is the right thing.

The CHAIRMAN : I think we have Mr. Adam Bell, of Tavistock, who can answer that question.

Mr. BELL : In answer to Mr. Lochead I can say that, according to the experiments that I have conducted at Guelph, we find that adding two per cent. pays the men for the cheese that is in the milk, but three per cent. is going too far. Two per cent. is a very simple way of making up the books, and we find it is the only just way of paying for the milk. Paying for the fat is not right, and adding two per cent. is as near as we can get.

The CHAIRMAN : Is it nearer than pooling the milk.

Mr. BELL : Yes, it pays the man for the cheese that is in the milk, and we think that is the right way to pay for the milk.

Mr. WHITE : Which do you think is the best way of handling whey ?

Mr. MILLAR : I think the only right method is to feed it at the factory. I would not return it in the cans on any account. I know one factory where they returned it, and they lost more money than would have paid for all the whey in the county. I would rather have it some distance from the factory, where you would not have any bad smell or bad flavor from the hog pens. Still I think you can put the pens on the north-east side of factory, and you would hardly ever have any smell, because the prevailing winds are from the south-east.

A MEMBER : How is it that there is no distinction in the cheese on that account when they buy cheese ?

Mr. MILLAR : There is no question about the right and wrong of it ; but why they do not make the distinction you will have to ask the cheese-buyer.

The CHAIRMAN : The flavor has not been developed in the cheese when they are being sold, and some factories take good care to see that cans are cleaned out. If cheese is new it is very hard to detect it. Sometimes the flavor does not appear in the cheese until it reaches the old country. If I had my choice of buying a lot of cheese to keep, I would certainly buy cheese where the whey did not come back in the cans.

Mr. DERBYSHIRE : The main reason is on account of the generosity of the buyer not wanting to have any trouble with a friend he buys the cheese from.

Mr. BALLANTYNE : I think the reason why the difference is not as great as it should be is because of the system of selling by which cheese are all sold at the market before the buyer has seen them, and he does not know the quality of the cheese upon which he is bidding. He is bidding for the finest cheese always, and if the cheese is not of the finest when he gets to the factory the price is adjusted there, and in may cases the reduction is made and the poor cheesemaker foots the bill for which he is not responsible in the slightest degree, and the patrons never know anything about it. During the year that has passed there were a great many cheese in the Ingersoll district that were left on the factorymen's hands much longer than usual. They were sold to one of the buyers and, after he went to inspect them, he found them showing a great deal of flavor, and almost every lot of cheese in that section was rejected, and were sold afterward at a big reduction from the original price. I said at the time that these cheese simply developed their true character because they were left long enough in the factory to develop it.

A MEMBER: Let us take two cheese, one made in the factory where they return whey in the cans and it is emptied as soon as it is returned to the farm, and another cheese that is made in the factory where they do not return the whey in the cans, and is there a buyer here who will, under oath, state which is made where the whey returned in the cans, and which cheese is made where it is not returned in the cans?

Mr. DERBYSHIRE: The trouble is, they do not empty the whey out of the can immediately when it returns home; if they did, and washed the can out with luke warm water, then scalded it and turned it up with the bottom two inches higher than the top and aired it thoroughly in the sun, that can would be all right for taking the milk to the factory. I have driven along roads in the afternoon and found whey on the stand that had been there four or five hours back, and the acid was developing. That is what I call using milk cans for a swill barrel all day, and then putting milk into that sour can, and I tell you that I am one who can tell the flavor in cheese made from that style of milk.

Mr. JOHN BLANEY: I am sorry that the cheese buyer would want to make the patrons suffer for the sins of the little ones. I do not know of any cheesemaker in our section who is paid for making bad cheese If the buyer buys cheese and pays the same price to factories that send back the whey as to the factory that sends no whey back, how can you expect to educate the patrons on the point, when you pay the same price in both cases? (Applause.) You are after the money and we patrons are after the same. Pile into the man who deserves it and let innocent men go free.

Mr. J. W. LEE: I have produced milk for over thirty years I am one of the directors of the factory I produce milk for, and we made a law that every patron was to provide a receptacle for the whey, and every milk drawer as he returned the whey back from the factory, was compelled to empty that whey into the receptacle, not within 50 or 75 feet from the can stand, and the can was to be taken back and put upon the stand. The whey is not in these cans more than an hour or an hour and a quarter, and every patron is compelled by the company under fine to wash these cans and have them thoroughly aired and cleansed before twelve o'clock in the day. Under the circumstances, I do not believe in having to kill my dog because somebody else's dog kills sheep. There are filthy persons in all localities, and filthy persons engaged in all businesses. The farmers, as a rule, raise a great many hogs, and, as a rule, desire the whey to be fed back on their farms, and I do not think any person will say there is any harm in carrying the whey back and having it there for an hour and a half. (Applause.)

The CHAIRMAN: I think if you would guarantee that ever patron in the country would do that, empty the whey before twelve o'clock and thoroughly scour and cleanse the cans, there would be no harm done. But if you cannot guarantee every patron will do it, I think the sooner you stop it the better.

A MEMBER: If the buyers knew the flavors developed, could they not discriminate against the factories?

The PRESIDENT: That depends upon to what extent the whey flavor exists.

A MEMBER: Mr. Millar said to clean the tanks out once or twice a week. My experience is once a week is not often enough. We should have tanks well made, so that they can be pumped out perfectly clean, and I have found where that is practiced and the tanks cleaned out twice a week there is not so much trouble.

Mr. MILLAR: How would you like it if your tank was not cleaned out more than once or twice a season? I tell you there are 50 per cent. not cleaned out more than once in the season, and these underground tanks should not be countenanced at all.

Mr. E MORRISON, Straffordville: I have had some experience in sending back whey in the cans. In the factory for which I worked, we cleaned the tanks out twice a week, and we find, as the cheese cures, this whey flavor will develop. The quicker we can get our cheese off on the buyer the better it is for the patrons, and I think the point Mr. Ballantyne touched upon is a very delicate one. I think if the buyers would visit the factories, see the cheese and know exactly what they were buying, there would not be as much blame cast upon the cheesemaker, and the patrons would be paid for exactly what they have to sell. If they want the whey back in the cans let them pay for the whey.

Mr. W. R. SHEARER: I would like to ask, if these flavors devolop in the cheese, does it hurt the quality of our Canadian cheese and does it lessen the price we ought to get? Now, I think perhaps there is something in it. I was in a factory where the cheese was very nice, and the cheesemaker had kept some of the cheese from the previous shipment, and I examined one of these cheese, and I found that it had a very strong whey flavor. I asked him if this was one of the rejected cheese and he said "No, it was one of the best cheese in the factory." I asked him if he had noticed this development, and he said he had not, and then he went up and looked at it and said he could detect the flavor plainly. The trouble is not only in the cans, but also in the whey slopping round the wagon. If the whey is allowed to be sent back it creates a great many evils that are hard to get over, and there ought to be some remedy for it.

REPORT OF INSTRUCTOR MORRISON.

I have much pleasure in presenting to you my report as instructor for the season of 1897. The district allotted to me was the south-western portion of Western Ontario, comprising all south of the main line of the Grand Trunk Railway and west of Oxford County, together with a few of the Oxford factories.

My work for the Association commenced on the 14th of April. By orders of the Board I visited 28 factories from which applications had been received for services of instructor, viz.:—two in Oxford, seven in Middlesex, three in Elgin, four in Kent, six in Essex, five in Lambton and one in Norfolk. Of these factories, I visited three once each, nineteen four times each, one five times, four six times each and one seven times. I also spent in conference with the other instructors, three days at Bright factory, one day at Tavistock factory, one day at Black Creek factory, one day at Thames factory and one at Strathallan, making in all 122 days spent in working for the Association during the year 1897. I tried to visit the factories as nearly as possible at the time asked for in the applications made by the factorymen. This, however could not always be done, as it would have incurred a much larger expenditure of time and money.

Buildings. Of the twenty-eight factories visited, I class nine as good, eleven as fair and eight as poor or in bad condition. The floors in many of the make rooms are in very bad condition. Often there are holes or broken places in the floors, allowing the whey and wash water to run through, causing offensive and injurious odors underneath the factory.

Whey. From all the twenty-eight factories on which I am reporting, the whey was returned to the patrons in the milk cans. Of these factories eight kept their whey tanks clean, nine fairly clean and eleven dirty, some being very dirty. Here is where a great deal of the trouble that cheese-makers have to contend with in having tainted or gassy curds, comes from—drawing home the whey from the sour dirty whey tanks, in old, and sometimes rusty milk cans. The cans frequently not being washed sufficiently to take all the bad flavors of the sour dirty whey out of them, is an abomination that should be prohibited. Most of the makers have enough of such milk cans coming to the factory every day to give their milk a gassy flavor. Wherever I found the whey tanks dirty I advised the maker to clean them out, and note the difference in the milk he would receive then from what he was receiving while the tanks were dirty. Some makers would promise to have them cleaned right away and would do so. Others, I am sorry to say, would promise, but when I came back the tanks were as dirty if not worse than when I was there before. Whenever I found the tanks dirty I reported them so to the secretary.

Curd Sinks and Curd Cloths. Most of the makers kept their curd sinks fairly clean and some were nice and clean, but there were two or three cases which were an abomination. In one case I refused to have anything to do with the curd unless the sink was washed before the curd was dipped, and even then when the curd was thrown out in the sink, the warm whey under the slats caused a very bad smell, enough to spoil any curd.

Curd Cloths. Some makers wash and keep their curd cloths sweet and clean, while others have them anything but clean. When you find the sink cloths hung out on a line to air, and the racks of the curd sink set up in a nice airy place, you will generally find everything else in the factory in fair order, and the cheesemaker making good cheese. The dirty cheesemaker should go to the Klondike, where money is taken out of dirt, for he will never be able to find it in the dirt in a cheese factory.

Common Mistakes. A common mistake with cheesemakers early in the season, was in using too much sour milk as a starter, and also in ripening the milk too much before setting. In both cases the result is a harsh, acidy cheese, which the buyers do not want. Ripening the milk past a certain degree of ripeness retards rather than hastens the process of cheese-making. As milk does not work alike in different localities—even in neighboring factories the milk does not work alike—cheesemakers require to be expert and use their best judgment to find out the right degree of ripeness for setting milk. They should also use the rennet test for every vat, every day, being careful to have the milk at the right temperature while testing. By doing this a cheesemaker can have fair control over the working of the curd.

Another mistake of some makers is keeping the curds covered even in warm weather. Covering curds and piling them in the sink after milling holds any bad flavors that may be in the curd; whereas spreading the curd evenly over the sink allows the flavors to escape and also cools the curd down to about the right temperature for salting. It may be necessary, in the cold make room later in the season, to cover the curd, but the flavors then are not so bad to contend with as in the warm weather.

Turning Cheese. A number of the makers did not turn their cheese in the hoops in the morning, claiming they had not time to get them turned before the milk started to come in. Whenever a maker puts forth an effort to do it, the time can always be spared for that purpose. Makers always admit they can make a closer and a better finished cheese by turning them in the hoops in the morning.

Boxing Cheese. Some of the factorymen are careless in the boxing of their cheese for export. I will mention a few of the complaints the buyers have: 1. Bad fitting boxes. 2. Cheese too deep for the box. 3. Cheese-box too deep for the cheese. 4. Bad fitting covers. 5. Patrons drawing the cheese to the station in dirty waggon boxes. All these faults can be easily overcome by a little trouble on the part of the makers, and patrons and will thus reflect credit on both themselves and their factory.

Testing Milk. Of the twenty-eight factories visited, twenty-four had Babcock testers and four factories had no means for testing the milk. I tested 2,889 samples with the Quevenne lacometer and 131 samples with the Babcock tester. Of these 131 samples tested with the Babcock tester, the lowest sample tested 1.80 per cent.

6	Samples	tested	between	2.00 and 2.50	per cent.
18	"	"	"	2.50 and 3.00	"
65	"	"	"	3.00 and 3.50	"
24	"	"	"	3.50 and 4.00	"
17	"	"	over	4.00	"

Seven patrons admitted tampering with their milk, four watering, two skimming and one both watering and skimming. There were no prosecutions as the factory-men (with one exception) did not want to prosecute, but were always anxious to let the guilty ones know that they had been caught tampering with their milk, and with a warning not to do it again, they were allowed to go free.

Questions Suggested for Discussion. The following are a few questions that would be of general advantage to hear discussed at this meeting, by buyers, salesmen, cheese-makers and patrons :

1st. Why some cheese-makers will not stencil the date and number of vat on their cheese? Do the buyers want this or do they not?

2nd. Why do the buyers not enforce the branding of the word "Canada" on the cheese and box before accepting the delivery of the cheese from the factories?

3rd. What is the cause of mottled cheese? What means should be taken to prevent it?

4th. Why do cheese-makers bind themselves to make good the loss which occurs from flavors or other causes over which the maker has no control?

5th. How does the present system of selling cheese affect the cheese-maker?

In conclusion I take this opportunity to thank the President and Directors of the Association, and the cheese-makers and officers of the factories for the courtesy and kindness extended to me throughout the season.

All of which is respectfully submitted.

James Morrison.

REPORT OF INSTRUCTOR CLARKE.

I have much pleasure in submitting my first report as instructor for your Association during the past season of 1897.

I commenced my work on the 28th day of April and finished on the 29th day of October, working in all 134 days. I visited thirty nine cheese factories, giving from one to five each. One of these I found six making fine cheese, eight making stiff, coarse textured cheese, five making weak, open-bodied cheese, one making a variety, and the remainder making fine cheese, but not uniform.

Of all the factories I visited during the season I classed : Two as very clean, eleven as clean, nineteen as fairly clean, four as dirty, and three as very dirty.

I am sorry to have to report that the makers in these very dirty factories were very careless, untidy fellows.

The curing-rooms at these dirty factories presented the same untidy appearance, having dirty floors, windows bespattered with fly dirt, and at least one year's cobwebs, with an occasional torn blind or broken sash which partially obscured the light of day; cuttings from cheese boxes lying around for two or three days following each boxing of cheese, and never swept cleanly from places a little hard to get at—the whole atmosphere laden with a heavy musty smell for the want of proper circulation. The cheese were uneven in size, lopsided in shape, with projecting sharp, rough edges, caused principally by the use of small followers and the lack of turning in the hoops, bandages not evenly pulled up, leaving bare places which crack and form inviting places for blow flies to get in their work; the general appearance being such as would cause a buyer coming into the factory to begin at once expecting faults in the quality.

When making my first visit I said to these makers : The first thing you have to do is to clean your factories and everything in them, and I assisted them in cleaning while there; but when I returned I found them as before—dirty. I would say here that if a man is not cleanly about himself and clean about his work, he has no place in a cheese factory, and no matter how long he remains in one he will never be a success.

I found it difficult to get some of the makers to turn their cheese in the hoops in the morning, which caused them to have the rough unfinished appearance that I have already described in the curing room. The reason giving for not turning in the hoops was lack of time, and that they considered their cheese as well finished as some that were turned, which reasons I consider have but little foundation in fact. I am pleased to state, however, that I succeeded in getting the majority of the makers to turn them.

I might also say that I found a number of the makers not cooking the curd sufficiently before dipping, which caused them to have a soft, soggy curd, and also to be a poor keeping cheese, while others were cooking their curds well, but matting too much before milling, causing their cheese to have too much acid for the production of fine cheese.

I tested 982 samples of milk with the Quevenne lactometer and 275 with the Babcock tester. Of this number:

7	samples	tested	between	1	and	2	per cent.	butter	fat.
34	"	"	"	2	"	3	"	"	"
157	"	"	"	3	"	4	"	"	"
53	"	"	"	4	"	5	"	"	"
2	"	"	"	5	"	6	"	"	"

Of these I found twelve samples which had been tampered with. I visited the farms of these parties, and took samples of milk from their cows, and they were requested to meet me before a Justice of the Peace, and were fined from five to six dollars each and costs.

A majority of cheese-makers in the district over which I travelled mark their cheese with the day of the month upon which they are made, and the number of the vat in which each is manufactured, but a very small percentage keep any daily record or diary of each day's work, which would enable them to derive the full benefit from thus marking their cheese. In my judgment such a diary can be made the best educator in any maker's experience. It properly kept, and the varying conditions of each day's work, such as the temperature and condition of the atmosphere, the flavor and condition of the milk, the pecularities and treatment of each curd during the process of manufacture, etc.,—are carefully noted at the time each day, it affords the very best means of tracing results and puts the operator in a position to become master of his own business. Especially will this method assist makers when going into factories for the first year when the surroundings and everything is new to them.

And I would strongly urge those makers who are not in the habit of putting the day of the month and the number of the vat in which cheese are made upon them, to begin at once, as it is a great assistance in many ways. One of them is to enable them in case that one cheese of a batch is found wrong to separate the entire batch without having to try every cheese, and possibly three times as many more, to find them.

Let me in conclusion take this opportunity of thanking the officers of this Association and dairymen for their kindness to me during the past season.

Alex. F. Clarke.

Mr. Chairman: I take more pleasure in introducing Prof. Robertson than any other man in the Dominion of Canada. We both used to make cheese in London township. He used to manage the North Branch cheese factory, and I one at Bryanston, and I remember very well that we sold the last four months' cheese at fourteen cents per pound.

GOVERNMENT CO-OPERATION IN DAIRYING.

By Prof. J. W. Robertson, Dairy Commissioner, Ottawa.

It is true that the President and I, when makers, several times sold large lots of cheese from twelve and a half cents to fourteen cents a pound; but it was not so hard to get cheese to pass then as it is now. The buyers were not half so fastidious, and the cheesemakers did not have half so many difficulties. In listening to these reports this afternoon I note with a great deal of pleasure that the cheesemakers are making a great deal of progress. At the same time their reports denote that they are having far more trouble than they did many years ago. Let me instance that by telling you that we began dairy work in the far Northwest, and when we erected creameries there, we had no trouble in getting the patron of the creameries to send his cream to us five times a month in the nicest of sweet condition, too. Now more cows are kept, and more creameries, and all these germs that get into the milk have become so abundant, that at one creamery we have to get the milk in as often as in Ontario, as the milk becomes sour so soon. In Ontario you have far more difficulties than you had when I made cheese in the North Branch cheese factory, when my good friend, your President, used to come to the factory, and a jolly good fellow he was too.

I noticed that all these reports that have been read come right down to details, and some of them make a great deal of small matters, so some people may think. Some one has very wisely said that attention to small matters is what makes perfection possible, and perfection is no small matter. There is no possibility of getting our cheese and butter made of such a sort as will keep us at the front in England unless we give due attention to these small matters. In Sweden, a country from which we get the closest competition in the manufacture of butter, it is almost a general rule and practice that those who milk the cows shall put on a garment, something like the English laborer's frock, of cheap cloth that will reach to the ankles, with holes for the arms, and the cows have their flanks and udders moistened with a damp cloth, so that whatever dust there may be shall not fall off, and that has made an appreciable difference in the keeping quality of the butter. That is a small matter, but, unless we attend to the small matters, the Swedes will keep the best customers and the first place.

By the way of directing some discussion during the convention, I will speak of some things with regard to which there might be more co-operation between the dairymen and the Department of Agriculture than there is at present. I find, in my correspondence and in my contact with dairymen over the whole country, that many of them have almost no correct notion of what the Department of Agriculture is, and therefore they often expect the Department of Agriculture to do certain things apart from them. It can have no service ability except as co-operating with the dairymen, in not doing things apart from him but working together with him, to help him to do more for himself and perhaps in some cases to do it first for him what he could not do alone. In the Province of Ontario, you first of all have excellent soil, a very excellent climate, and you have skilled labor of the highest order and comparatively good markets. Now, how can the dairyman make most of these. These are all he has to make anything of. These are the things out of which he has to make wealth and profits. To begin with the last, the pioneer farmers all over the Province had to do most of the work alone, because that work was mainly muscular labor and it was done mainly alone. It was the economy of making the best of things, but it had almost nothing to make anything of. Now that has all changed; muscular labor is not now the main thing on a farm. It was the main thing for a farmer then to be a very strong man, and it did not matter much whether he hid much thinking or not. Now muscular labor counts for a good deal, but mental clearness of vision counts for far more. The man who can see the right thing to do, and the man who will merely do with some things but will make the most and best of all he has in the way of land and climate and labor and markets, and co-operates with various people to do the best for himself, is the man who gets on in the world.

Take one instance, when in early days one wanted to build a house, he could not do all his work alone but had to get his neighbors to help him, and he called that a "bee"; and in that way they got individual benefit and, as far as we can still extend that co-operation the whole community will be benefited, and the individual will also receive benefit. The Department of Agriculture is a branch of the Government. What is Government? The most of us think it is some sort of an affair of extraodinary power like a Deity that may do good or harm according to its own caprice. There are governments like that; perhaps the government of Russia may be like that. But here, in a country like ours, and especially all over the Anglo-Saxon Empire, you have a government which is of the people acting together, first to give security to life and property, and then to make the land worth living in, the best possible land for the people to live in, all the people acting together.

So when the dairyman wants the Government to do something for him, he is merely wanting all the people, asking all the people, to help him to build his house, till he gets started, till he might afterwards live in a better house, and to be able to do something for the people. That is where the Government is justified in doing things for people to help them, so that these people can do things for the people afterwards.

There are three main lines along which the Department of Agriculture can help the individual dairyman. First, of all, there must be an effort to gain the confidence of the dairyman in the ability of the Department to give him some help. Unless he believes that the Department of Agriculture can give him some help, then he will not take it. In the second place, to gain the confidence of the dairyman in the willingness of the Department, to give what help it can. And thirdly, he must have confidence in ability and willingness as the basis of all co-operation. First of all, confidence in the ability of the Department, to get the dairyman and the Department to co-operate—not to expect the Department to do things apart from the dairymen. As Anglo Saxons and people under the British flag, the one thing we pride onrselves most in, is that spirit of independence that does not want to be spoon-fed by anyone, that does not want to have anything done for us that we can do for ourselves. We want to try and gain the confidence of the people, the Government doing what it can do, the dairyman doing what he can do; otherwise the Government might be useless and the dairyman unable. The Department is trying to enlarge the co-operation of the farmers with each other. First, to get the farmers to co-operate with the Department, and then, to get the farmers to co-operate together, and to do for the individual farmer what he cannot do alone, that he might be able to do it himself afterwards. As a first instance of that willingness to co-operate with the farmers. I will give you an instance from history; and as history always repeats itself, there will come times in Ontario when a like history that I am going to relate will repeat itself. Prince Edward Island is one of the most beautiful Provinces of Canada. In 1892 there was just one little tumble-down factory hardly making any progress, in fact, it was to be shut up. The Government got the people to co-operate with them in building cheese factories, the people put in the money for both the factory and the plant, and the Government doing the making for a year or two till the people got to know how to make it themselves; and now as a result of that, in 1897, the people of Prince Edward Island turned out 47,000 boxes of cheese, and the Government did not run a single factory. That is a case of the Government getting the people to co-operate to do good work for themselves, and I think there will be a time when Ontario will need the same kind of help. I give you this instance to show how the Government may induce the people to co-operate among themselves. You know the people of Ontario have been co-operating in making cheese in the summer time. In 1891 there was not a single winter butter-making factory, but, by getting two started in 1892, the result has been that the people are now co-operating in about 100 factories in the winter. These things did not amount to much then, but it is like a boy rolling a snow ball—it gets gradually larger. There are several lines in which we might begin to roll the snow ball. Start little things, and they will soon develop. Lots of men in Ontario, who make butter would like to have their butter sent to England so that it would not spoil on the road, but an individual dairyman could not engage a cold storage car, and he could not put cold storage on a ship at a heavy cost. But if that could be started by the Government it would soon pay its own way. I think, too, there are other lines where this Dairymen's Association should be able to counsel the Government, and that is why I am here representing the Minister of Agriculture, to learn what you think the Government should do for you; and, while it is wise to spend a good part of the afternoon in discussing how to do little things, you must also discuss what the Government can do for you. Then I want to show you how certain lines of investigation can be adopted. I would be glad if the Association could have certain experiments carried on as suggested by Mr. Millar. Take, for instance, as to how you can keep mould from growing on cheese. Last year Mr. Ruddick and Dr. Connell sprayed a cheese half way around with a cheap solution, and that side stood absolutely clean but the other side got mouldy. That was experimental work, to find out things for the benefit of the people at large. In that class of work, the Department of Agriculture is carrying on a good deal of experimental work to find out things for the benefit of the farmers.

I take exception to what was said this afternoon about the effect of rye on milk. Perhaps I am wrong in my judgment, but I am quite sure of my facts. I have fed rye to cows and found no bad effects of any kind on the milk or butter or cheese, and I say it is a capital feed, and we need feed of that kind, which is cheap. You may get an odor on the milk. Whoever fed clover to a cow that did not get a strong odor on the milk, and who would condemn milk for that reason. Clover is one of the best feeds we have in Ontario. I would have the rye pasture, and I would have it grow, even up till it headed out, and if you cut that rye you will get a delightful flavor. If you feed that rye growing, you will bloat the cow, but if you cut it and leave it in the field one day and then feed it, you will find your cows will thrive well on it.

Then we do work in the stable with cattle, do work in the factories, and do work in the orchards, and in cold storage buildings. We do these things to find out matters for the benefit of the farmer. Not only this actual work in the fields, and in the factory, but men like Dr. Connell, chemists and bacteriologists, are doing most serviceable work for the farmers. He found out for us the value of food. I remember growing broadcast corn for my pony when I worked at the North Branch factory. I must have had a crop of forty tons to the acre. No one could have found out by looking at that corn whether it contained as much substance as corn grown in rows 3½ feet apart, but let the chemists take a sample of that and he will tell you exactly how much value in food the one is over the other, and in that way these men do a great deal of good work. Then take the work of the bacteriologist. I think if my friend Dr. Connell had come to me at North Branch and said there was a bacteriologist down at Guelph or Ottawa working on these matters, I would not have been quite sure whether a bacteriologist was a bug or a man. The word itself was hardly invented at that time to describe anything. I will now tell you a piece of work Dr. Connell did. We had a lot of trouble with rusty spots in white cheese. We have been working at it since 1875 and 1876, and then the people began to make colored cheese to hide these spots. We put this in the hands of Dr. Connell a year ago, and bye and bye he found something like red slime on the gutter that ran down from the factory where the cheese was made. He took that home, and found the particular bacterium that was doing harm. He had the gutters cleansed and found no more trouble in the factory. The cheesemaker said the trouble had been worse some days than others. Dr. Connell stayed there, and found it was because the wind was blowing in the direction from where this gutter was, and blowing this stuff into the factory. A bacteriologist finds out in a short time what could not be found out by a cheesemaker in a number of years. All the work of such men as bacteriologists, chemists, botanists and other investigators do good because they are critical. They are men who can criticise things in a constructive way. It is no help to anybody to have a man criticise in a fault-finding way. Then we are trying to shed a kindly light of knowledge by means of reports, bulletins, travelling dairies, spraying instructors, etc.

Now just a word about this Association. An organization of any kind never creates any power. When people talk of organization they never create any power. The Association does not create power, it merely provides a means of contracting energy. It is doing good work. It has done a great deal of good work, and some people think it is just about played out because there is nothing more for it to do. There never was a time that we had so many troubles at the stable, in the factory, and in the milk itself ; and therefore, I say, if there ever was a time when the organization was useful it is more so now.

I need not hint how it can be useful. It can be useful by getting things from discussions. I like the man who has the courage, with all modesty, to express wherein he differs from any other statement. An association of this kind will help discussion with regard to production and with regard to manufacting. The manufacture of cheese is not finished when it is put on the curing room shelves. That is not the end of the maker's business. The end of his part of the business is, when the cheese are put in the boxes and delivered from his factory. When cheese are being cured you have two things. First of all, the curing is a process by which flavor is developed. I do not remember tasting cheese that was a day old, that had an objectionable flavor, or a flavor in regard to which you could make one cheese differ from another. But the germs are all there, and they may or may not be brought into activity. If you have cheese that are put into a curing room at about 75° temperature, and kept warm four or five days, what happens? All that class of bacteria that are in the milk are developed, but if you keep the cheese at 65° you would have the smells. Over in a warehouse in London last year, I found a sample of very superior Canadian cheese, fine in body and nice looking, and in a clean box, and the boxes nearly all whole. The market was active ; forty-two shillings the top price. These Canadian cheese had a little heated flavor, not a bad taste or bad flavor. In the same warehouse were a lot of cheddar cheese no better in the body, but they had never been heated, and did not have that objectionable flavor, and they were sold at sixty shillings a cwt., with a demand for more of that kind. Sixty shillings as against forty-two, because one cheese had been heated and the other not. So I say there is room for cheese makers to try and control the temperature so as to get that mild cheese.

The same thing is true with regard to butter. If butter is kept perfectly cool from the day it is made, it will stay unchanged. But if it is made in hot weather from over-ripe cream, when it gets to England, it will go off fast. I had some butter made in May from one of our large creameries that was making about 2,000 pounds a week, and I had butter made in the Northwest when the season was cool. It was capital butter and it was sold in Liverpool at the end of December, when there was not a very good market, for 98 shillings a cwt. It was not a very high price, but was the highest price going. I do not advocate the holding of butter from May to December, but if butter is put in cold storage the day after it is made, you could land it in England at any time in the best condition. That butter was shipped 2,500 miles and it was kept and sold in December. A creamery man who had a cold storage place at his creamery where he could put his butter in the cold storage as soon as made, would have a big advantage. And the same in making cheese ; if you have cold storage you can keep your curing-room down to 65° or 70°. The quality of Canadian cheese and butter when they start from the maker, is usually good, except in the case of our hot weather cheese, and we now make an effort to have this butter stay in as good a condition as that in which it starts. If the goods start in good condition and are spoiled, there is a loss to somebody. The loss of Canadian products last year, their depreciation in quality on the journey to market, would not be less than $2,500,000, and somebody lost that. Now if the Government can, by making the improvements in transportation facilities, save that much money to the people, it is worth spending money to do it. We have a good deal of competition in the market in England. Other countries have facilities for landing their products right, and we should have the same.

The British public are very fastidious in regard to the name that things have. I was called before the House of Commons Committee to give evidence on a certain subject last summer, and I will tell you what the cheese buyers over there said. You know cheese buyers over there are men of unapproachable and unimpeachable veracity. One of them said he had seen a great many of Canadian cheese, and he knew they were being sold in some places as the best English and best Scotch cheese, and he said that cheese from Canada was all so bad that it was spoiling the demand for and the consumption of British made cheese Now, I am sure that man was wrong in his evidence, but if we could get our names stamped on our cheese, they would know when they were eating Canadian cheese. There is a chance now in England for having things received better than before. We may never in twenty-five years have a chance of getting the same attitude towards Canada. Things in England go by fashions, if it gets fashionable in England to do anything, they do that one thing. They wear atrocious clothes, because it is fashionable. Just now it is fashionable to have Canadian things and that is just the time for us to put " Canadian " on everything we have and keep other people from putting " Canada " on things. The Danes are great advertisers. Some people were taking the

Danish bacon and selling it for the best Irish. The Danes did not wait for the Irish to take action, but they had a man there to prosecute this man. During this past year there have been cases where Canadian bacon has been sold as the best Irish and Scotch, and the Irish have prosecuted and got convictions. Our bacon is the very best, and it is sold as Irish or Scotch bacon, and the Irish and Scotch get the market reputation and our bacon does not get the market reputation, and there are farmers who do not get the price of their hogs. To give you an instance, the owner of a large hotel in Toronto was in London last year and was particularly well pleased with some bacon he got, and he thought if he had bacon like that in his house, he would have just what his guests would like, because it is hard in some places to get bacon you like. He got the name of the firm in London that was selling this bacon and went down and bought enough to make two big bales. "Where will we send that bacon?" "Send it to me, Toronto, Canada." "Toronto?" "Yes; that is where I want it." The man smiled and said, "This bacon was imported from Toronto, from William Davies Packing Company."

I suppose it came from some good cheese factory fed hogs in western Ontario, lean hogs fed on whey and some grain to make the best bacon. This bacon that was sold as the best Irish or Danish had come from Canada first.

The Act passed last year requires every cheese maker to have "Canada" branded on his cheese and the law will be enforced in 1898, and there is a penalty attached to disobedience. In connection with co operation, the Government could do a good deal in providing improved and regular transportation for delivering butter and cheese, bacon, eggs and poultry, etc., in the best condition in England.

In these regards I have thrown out some hints, and the Department will be most happy to co operate with the farmer in endeavoring to help him make the most he can of his business.

GOOD ROADS AND THE DAIRY.

By A. W. Campbell, Provincial Instructor in Roadmaking, Toronto.

Throughout all these meetings, it seems to me that there are two distinct objects placed before you. One of them is the securing of a better quality of butter and cheese, in order that Canadian butter and cheese will be superior to all other brands of these products offered for sale in the foreign market. The second of these objects is the cheaper manufacture of these articles.

By producing cheese and butter more cheaply, they can be sold at a profit more cheaply, thereby enabling you to undersell and drive from foreign markets, more particularly the English market, other competitors. Not only will cheaper production give you greater control of this market, but with lower prices, there will be a greater demand for your products and a greater quantity consumed; for I need scarcely tell you that the majority of families in the old world, as well as in the new, are compelled to practice economy in their domestic affairs, and butter at 15 cents a pound and cheese at 12 cents a pound will find a much greater sale than is created when butter is at 25 cents and cheese at 20 cents. You have now secured about 70 per cent. of the English cheese market, and there appear to be no reason why you should not obtain the remainder.

To this end the dairymen of this country are urged to build a better class of barns, are urged to keep a better grade of cows, to adopt better methods of feeding, to raise feed and pasture in certain systems of rotation. For factories, inspectors and instructors have been appointed, and no detail appears to be of too little importance to be overlooked. When such is the case, then a matter of such great importance to dairymen as good roads should find very enthusiastic advocates in the members of this Association.

I once tried to point out to a worthy farmer in eastern Ontario the benefits of good roads in connection with dairying industries, but the old gentleman shook his head. "My cows," he said, "don't know a good road from a bad one." That argument was too much for me. I had to admit that perhaps his cows did not know a good road from a bad one.

I did not tell him that his cows could not tell the difference between a well conducted cheese factory and one that is badly managed. It would have been useless to do so. That man is not here to-day, nor will he read the proceedings of this Association. If he were likely to do so, or if he had ever read the reports of this Association, he would not have made use of such an argument. So I will say to you what I did not say to him, that this man's cows very probaly had more intelligence than their owner. At another meeting, when I was introduced to the audience, an old gentleman in the back of the hall stood up and said, "I thought you were an older man. I made roads before you were born; I'm darned if I'm going to sit here and let you tell me how to make good roads."

Ex-Lieut.-Governor Kirkpatrick, addressing the Ontario Good Roads Association at its second annual meeting, said. "Now that the country is better settled, and the competition in agricultural commodities is becoming so keen, it is necessary for the farmer to get his products to market with the least possible cost. Not only must those products themselves be of the highest possible quality, but they must be placed upon the markets of the world at the minimum cost of transportation. If the means of transportation are impeding you—costing you three times as much as if you had good roads—it means just so much added to the cost of production, and the remuneration you receive is reduced accordingly.

In 1897 the total value of cheese and butter manufactured in the factories of this Province was about $12,000,000, the greater proportion of which was exported. In the production of this, about one-third of the rural population of Ontario was distinctly interested. In the production of milk, butter, and cheese, there is invested at least $175,000,000, while the total annual production has a value of $35,000,000.

There is a feeling, and a very general one, that the cost of manufacture is now too great; that too much money is retained by the factories as the cost of production. I find that in 1896, the total value of cheese manufactured was $8,646,735. Of this, $7,040,927 was returned to the patrons leaving $1,605,808 as the total cost of manufacture. This sum amounts to about one and one-half cents per pound of cheese.

Prof. Dean, of the Ontario Agricultural College, has estimated that the actual cost of manufacturing one pound of cheese is three-quarters of a cent. I find, on reference to the returns from various factories, that the cost of hauling and transportation reaches, in many cases, two cents and two and one-half cents per pound. It has been estimated that the actual cost of making and hauling milk and cheese should be reduced to one cent per pound in order to make dairying profitable. I am convinced that the effect of good roads would be to reduce the average cost of manufacture and haulage by one-half cent per pound bringing the total cost to one cent, the condition at which dairying would pay, and what do we find? In 1896 there was an output from Ontario's factories of 104,393,985 pounds of cheese. At one-half cent per pound, the saving would amount to over half a million dollars annually. That amount is about 6 per cent of the total value of the cheese manufactured.

Good roads would decrease the cost of hauling milk from the farm to the factory, and the cheese from the factory to the railway. The milk routes could be made longer, and larger loads could be carried. It was stated before this Association by Mr. Andrew Pattullo, M.P.P., at that time its president, that the actual cost of drawing milk to the factory amounted to $1,000 for each factory, and probably more. In consideration of the larger routes and larger roads, I firmly believe that good roads would reduce this expenditure one-third. There are over eleven hundred factories in this Province, and the saving for this item alone would amount to between three and four hundred thousand dollars annually.

As an illustration of this, and one which is directly in point, I would refer to the largest creamery in the world, in St. Albans, Vermont. Between 3,000 and 4,000 pounds of butter is the daily output. St. Albans is a railway centre, and because of this the creamery was located there, in order that the milk could be brought hundreds of miles by rail. By manufacturing in large quantities they can afford to pay the cost of railway transportation. Railways are merely smooth, hard roads with easy grades, making carriage cheap; and what railways have done for the creamery in St. Albans, good roads will do on a smaller scale for the creameries and cheese factories in Ontario. Addressing the Toronto Board Trade, Sir Wilfred Laurier recently said : " Let us cheapen the cost of transportation, and from that moment we have in the markets of Great Britain a preference for the products of Canada."

Goods roads would very materially assist in producing better quality of butter and cheese, and in decreasing the cost of their manufacture, the two aims, as I have said, upon which so much stress has been laid in all the proceedings of this Association. With regard to the latter of these, reducing the cost of manufacture by means of improved roads, the milk could be drawn greater distances, enabling, in some cases, one factory to do the work for which two are now required. Not only so, but in many sections, farmers living comparatively close to the factories are prevented from sending their milk to the factory by reason of the bad roads to be traversed. I need scarcely point out to you that this means a great reduction in the cost of production. The number of employees and the cost of the plant required are very much the same for manufacturing a small amount of cheese or butter as for manufacturing a large amount. This is a principle which is found in every variety of manufacturing industry, and cheese factories and creameries are no exception to the rule.

The quality of the cheese, I have said, would be improved by having better roads. That the continued jolting and churning which the milk receives in being drawn long distances over rough roads is very injurious has been demonstrated by those who are qualified to discuss this branch of the question. The products of cheese and butter factories are, it is further affirmed, more uniform when manufactured in large quantities, which, I have pointed out, would be accomplished by improving the roads in such a way that the milk can be drawn greater distances.

Referring directly to the benefits of good roads, the Hon. H. R. Emerson, Premier of New Brunswick, said on a recent occasion : " I have already given you assurance on behalf of my Department that the good roads movement will be furthered and encouraged as far as in our power lies. The betterment of our public highways, which are but avenues of transportation, and form an essential part of the great system which is necessary to transfer the products of our farms from the farm granaries to the busy markets of the old land is a most desirable end to be attained, from the standpoint of economics as well from social or other standpoints."

Mr. Pattullo, addressing the Good Roads Association in 1894, said : " There is no possible expenditure. present or prospective, which can be named which would at once relieve the people of this country of their burdens, and at the same time increase their profits to so great an extent as an expenditure in making good and permanent highways throughout the country, and maintaining them under competent supervision. We are already paying more for bad ones than good ones would cost."

With these forcible expressions from men eminently qualified to speak on questions of this description, what is there left for me to say? I have pointed out the loss occasioned by bad roads in cheese-making. That is but one industry in many. The agricultural produce of this Province has an annual value, it is estimated, of $200,000,000, all of which has to be drawn over bad roads. If the citizens of this Province could realize the amount we are every year paying for bad roads, they would have learned the secret of much agricultural and commercial depression.

But the members of this Association are not merely dairymen. They are citizens of Ontario, interested, from a personal as well as from a patriotic stand-point, in the welfare of this Province. They are engaged in other branches which will be benefited by good roads. They own land the value of which will be enhanced by good roads. They have children in whose happiness and prosperity they are more deeply interested, perhaps, than in their own; and whose daily journey to school would not be interrupted by bad roads. There is the church to attend, the public meeting, and the performance of various social duties with which bad roads interfere.

Roads in Ontario are made by statute labor supplemented by grants of money from the general funds of the municipality. The statute labor system has some commendable features, and under it a great deal of good work has been done, possibly at less cost than under any other system. It is, however, peculiarly subject to neglect and evasion, and this has been taken advantage of to such an extent that the roads have suffered in consequence. The way in which the work is slighted is too well known to require description. The teams and implements brought out to work on the road make up an assortment that would not be employed by any intelligent farmer on his own work at one-half rates. In eastern Ontario last summer I saw one man hauling gravel with inch boards on the bottom of his waggon and rails on the sides, but this is only one evidence of the evasive manner in which the work is done. It is generally done in a spiritless way. Some townships commuted the statute labor at such a ridiculously low rate as to practically admit that it has been shamefully neglected, and thus brought in to disrepute.

Statute labor is performed at a period of the year when the time of every farmer is of great value to him on his farm. If the work of improving our roads is neglected, and the greater portion of the time wasted, it must be apparent to all that there is a great amount of energy lost to the country, and our roads are being built at an enormous expense. As at present administered, statute labor is the most shiftless and extravagant system that could be employed by any municipality in making roads. The average townships appoints each year about 100 pathmasters, with as many different ideas of how the work should be done. One claims the width of grade should be fifteen feet, the second twenty feet, the third thirty feet and the fourth forty feet, and so on. One pathmaster claims the grade should be perfectly flat on top, the next that it should be just crowned just enough to shed the water from the centre to the side ditches, and the next that the grade should be heaped up; and this is done to such an extent that it is dangerous to turn from centre in passing another vehicle. One pathmaster believes in using gravel composed of thirty per cent. of sand or clay so that it will bind readily; another will use only screened gravel, and the next would use only broken stone. There are others who claim that a mud road is better than any other. Pathmasters are so numerous that each is surrounded only by a few neighbors, whose enmity they do not wish to incur by demanding a full day's work. On the contrary they often invite popularity by allowing, and even encouraging, neglect of work. All this indicates the necessity of proper system, plans, specifications, united effort, concentrated expenditure, and proper direction of the work. A plan of the township should be prepared, classifying the roads according to the nature and extent of traffic over them. About one-third of the roads in every township are main roads, used by the whole community, and consequently require to be made wider and stronger than others; about one-third are laterals to the main roads and, being used only by neighborhoods, are subjected to less travel and wear than the main roads. The remainder are back concessions and side-roads but little used. Specifications should give the width of roadway, which should be 24, 20 and 18 feet respectively; the amount of crown, which should be about one inch of rise per foot of cross section from the drain to the centre of the grade. It should also describe the kind of material, gravel or broken stone, to be used, how it should be prepared, and how it should be applied. The township should be divided into divisions not less than five miles in length, so as to unite the forces and secure sufficient labor to undertake proper work, which should be commenced at one end of the beat and continued as far as possible, extending it from year to year until completed. A commissioner should be appointed in each beat, continued in office and paid for his services, thus securing experienced men to direct the work. One man should be appointed in each township to act as general supervisor, to make reports to to council, and secure the carrying out of council's plans by the various commissioners, and to secure uniformity of work throughout the township. The council should provide modern machinery with which to do the work perfectly, expeditiously and economically.

The question is asked, how much will it cost and where will we get the money to build all the roads in Ontario? This seems to be a remarkable question to ask at this particular stage in the history of roadmaking in this country, considering what has been done in the past, and, in view of the small amount of work which remains to be done, surely it cannot now be a question of money. The time when roadmaking in this country was a difficult problem was when the early settlers, sparse in number, undertook the task. They had to fell the trees, grub the stumps, log, burn and clear the allowance; corduroy the swamps and bridge the streams, in addition to fighting the forest on the farm. If they had then asked "What will this work cost and where will we get the money?" Ontario would still be a wilderness and we would have no roads. With the allowances cleared, largely graded and drained, with our increased population, wealth, knowlege, the use of modern machinery, and aided by the large expenditure for this purpose, it cannot be so much a question of money as of systematic work, united effort, interest, and observance of the principles of roadmaking, and a study of the economic value of durable and finished work and its proper maintenance.

There is expended now, annually, on the roads of the Province about 1,000,000 days statute labor and $3,500,000 cash. With the amount expended in this way during the past ten years, and which will be expended, no doubt, in the next ten years, I would undertake to gravel and macadamize every rod of roads in this Province. Under the present system, this however cannot be expected, as the money, like the labor, is so scattered that nothing of a durable nature is undertaken, and the expenditure is lost. The importance of united effort and interest in the work may be seen in an example which recently came under my notice in an eastern township, where on a section four and one-half miles, the people had been working for years in five different gangs scattering their efforts and producing nothing beyond a series of annual patches. They, two years ago, united their forces under one live, active foreman. With two teams and a grading machine, in four days they graded to the first division road two and one quarter miles. This was then thoroughly rolled with a heavy roller. The crown was knocked off by running the grader one round from the centre line, and leaving eight feet wide in centre of grade to receive metal. The remainder of the people were then ordered out to haul gravel, which was close at hand and of excellent quality; all were ordered and obliged to haul a quarter of a cord, and before the statute labor on the whole section was exhausted, over one mile had been gravelled to a width of eight feet and a depth in the centre of twelve inches. The sum of $150 had been spent on this road during the past five years in small amounts; the council waa asked to unite their expenditure with the labor. This they did and the gravelling was extended another half mile. The people, seeing the splendid result of their work, clubbed together and finished the gravelling as far as it was graded. This was then thoroughly rolled until it was so hard and smooth that a load of gravel made no impression. Last year they acted in the same way and finished the remainder of road. Thus in two years with the assistance of $300, an abominably bad road, five miles long, was turned into a perfect sample of road. Now one-quarter of their statute labor will keep it in repair. If every section would take hold of the question in this way, every road would be made excellent in as short a time, a vexatious question would be disposed of, and all the benefits, pleasures and advantages of good roads would be realized, and under this system the money which is now being largely buried in the mud, would be sufficient to keep them in proper repair.

I am very glad to see the interest you have taken in this matter. To go over the whole question would take a couple of hours. Your President has taken as active an interest in the furtherance of good roads as he has in this Association, and you all know that ever since this Association was formed, he has ever been a most enthusiastic worker. I felt very glad indeed to receive an invitation to come here, and am very much pleased that you have given me such close attention to-night. (Applause.)

Mr. David Chalmers: I think about five feet is enough to leave flat in the centre to gravel upon. After grading the road we level about five feet and dump the gravel on there, and just merely round it off so as to allow the wheels to catch. What season of the year do you advise putting on gravel in that way?

Mr. Campbell: My plan has always been to put it on in the summer season, but of course I have always used a roller. Where roads are gravelled, the practice now is to put the gravel on the surface during the month of June, when statute labor is being done, but it very largely destroys the usefulness of that road for the season. I think, where the gravel is being put on by statute labor, it would be better to place it there later in the season. In the month of September, if possible.

Mr. CHALMERS: If we can put it on just immediately before wet weather comes on, it will take bond better than it will in the dry weather. I have given road construction a lot of consideration in the recent years, and I find one mistake has been made, that we cannot rectify, and that is double-track. If they had constructed roads from the first, so that you had a well gravelled road on one side and mud roads on the other, the farmers would not require to shoe their horses so often.

Mr. JOHN BLANEY: Have you any statistics of how much damage the municipalities have paid on account of not taking care of their roads?

Mr. CAMPBELL: I regret very much that I cannot get statistics. I undertook to get returns showing the amount of damage, paid by municipalities through detective roads. Some clerks would reply, and ask who was going to pay them for writing out these returns, others said it was none of my business how much it cost their township a year in damages; but I do know it amounts to a very large sum.

Mr. JOHN BLANEY: I think I can give you a little information on that line. For the last three years the township I live in has averaged something over a thousand dollars a year damages, on account of not taking care of the roads; and they made that a plea for not paying out any more money on the roads. I recognize the difficulty you have in getting information from the clerks. They are all combined against you, but I am glad you have the pluck to keep on. Recollect, the greater the battle, the greater the victory. (Applause.)

Mr. JOHN PRAIN: I think statute labor should be done away with, and men be paid to do the work. I have had a little to do with the roads in our township, and I have seen where the roads were gravelled, and the pathmaster has put mud on the top of the gravel.

A MEMBER: How are these rollers propelled, and what do they cost?

Mr. CAMPBELL: Drawn by two teams of horses, cost from $500 to $700.

Mr. JOHN BLANEY: One reason why a sensible man won't go on the gravel when it is put on, is because it is simply dumped on the road like a haycock.

ADDRESS OF WELCOME.

T. D. WILSON, Mayor of London, made a short speech welcoming the Association to the city. After replying to this, the chairman called upon Mr. Mark Sprague, instructor of creameries, for his annual report.

REPORT OF INSTRUCTOR SPRAGUE.

It is with pleasure I present this Report to the Central Advisory Board of the Eastern and Western Butter and Cheese Association.

On the 12th of April we began work among the winter creameries, or more properly defined cheese factories, which had put in butter appliances and were manufacturing butter in April. This work was promiscuous throughout the Province wherever there was a request, but was soon brought to an end by the prospects of cheese bidding fair promise as to price, which brought to mind the old adage "penny wise and pound foolish," or holding a penny so close to our eyes in April that we could not see a dollar in September. Through May and part of June, visited the creameries of the eastern division as directed, attending to those considered most in need of instruction as evidenced by the quality of their production.

On June 24th, started the regular inspection and instruction, under supervision of A. Wenger, to what are known as summer creameries of Western Ontario. Of these I visited thirty-two in geographical order, beginning at Ayton. Twenty-five were cream gathering, and seven milk gathering. The daily make of these creameries at the time of my visiting them was nineteen thousand, eight hundred and seventy-five pounds of butter, put up in nearly every case in packages suitable for export. The milk and cream, from six thousand two hundred and forty-four different farms or patrons was used and paid for according to its value by test. The cream gathering creameries used the oil test churn ; the milk gathering the Babcock tester.

A duplicate report bearing date of visit, condition of cream room and vats, work room and appliances, storage, drainage and suggestions on making and packing butter, was left at each creamery, so that the owner of the creamery would have, in plain English, our opinion without asking as to the adaptibility of his premises for the manufacture of butter. One creamery was found to be entirely unfit, and requested to be closed which was readily done.

The following grading was used : "Good condition," "Fair," "Unsuitable." The report as given, places the thirty-two creameries visited in the following order :

Cream room	16	in good condition,	12	Fair,	4	Unsuitable.
Work rooms	16	"	13	"	2	"
Appliances	20	"	12	"	0	"
Drainage	18	"	8	"	6	"

Number of storages under forty degrees, nine ; above forty and below sixty-five degrees, sixteen ; unsuitable for storing butter, seven.

It is to be hoped more of the creamery owners will adopt Prof. Robertson's system of cold storage for the coming year ; as wherever it has been properly put in, the very best results have followed. The percentage of the storages mentioned, which maintain a temperature below forty degrees is too small to obtain the best results and build up our reputation for export butter, even though it be fine when made. The high temperature of the storage soon robs it of its bloom, which can never be restored.

The report showed the amount of fees collected, which is a new feature in the creamery as all instruction and inspection under the old association, being, as you know, gratis. It might not be out of place for me to say that the conditions which exist at the creameries are somewhat different from cheese factories, and as a consequence make it difficult to collect a fee, or have an application for more than one visit at a creamery, especially cream gathering. They have never been accustomed to it. The cream or milk is paid for according to its value by test, and there is not the suspicion that some of the various patrons are skimming or watering their milk ; and the desire to have the inspector come and detect the offending ones, if there be such, and have them punished by a fine, half of which would be ample to pay for one or more visits, is never thought of.

Butter, unlike cheese, is not offered weekly at the various boards and sold subject to inspection, either at the creamery or elsewhere, and as a consequence so keen a competition is not aroused among the different creameries, and the demand for an instructor is not created. In too many creameries it has been the custom to hold the season's make from June to October without any comparison by way of price. This, along with an idea too general that it is not so difficult to make a fine article of butter as it is cheese, has had its influence along this line. These ideas will, in the near future, be overcome, especially if butter be sent forward weekly as it should be, as good facilities for shipping have been provided by the Government, when an expression of quality will then be given from the people, by market values.

Thus, along with studying the question of how to make dairying most profitable, two problems are presented for solution : The first is how to produce the greatest amount of butter-fat at the least cost, the second, how to save all the fat produced and market it in the form of a high priced product. Both of these problems are being studied not only on thousands of dairy farms, but at experiment stations.

If the value of the butter-fat annually lost in the buttermilk in the creameries of Western Ontario alone could be accurately ascertained the figures would reach such astounding proportions as to be almost incredible to those who have not investigated the matter.

The cream supplied by the six thousand two hundred and forty-four patrons to these creameries is, in nearly every case, obtained by deep setting, allowing the cream to rise of its own gravity. We have tested a great many samples of milk after these methods, and found surprising amounts of fat to be lost in this way, which also would amount to astounding proportions; consequently it is difficult to say just where instruction should begin or where it should end in the creameries.

In the eastern division a number of public meetings were held throughout the season in localities where creameries would likely prove successful, to educate the patrons for this particular branch of dairying, and a number of creameries are now in operation in these several localities. Similar meetings held in the west could not but have their influence for good for the coming year, especially to those who are raising the cream at home.

The character of the work in the east is also different, the creameries are all milk gathering, or separator creameries, and the desire to establish skimming stations to each, is general, there being now nearly as many skimming stations as creameries. About the same amount of time was given the eastern as the western districts, although a great deal more could have been done in the west had the conditions been more favorable. I have, however, endeavored to comply with the demands made both from the east and west throughout the season, and with your hearty co-operation, am satisfied great improvement has been made, but there is yet room for greater and nobler work. "Effeciency, progress, excelsior" should still be the motto for the year 1898.

Thanking you for your kind indulgence,

I am, yours very respectfully,

MARK SPRAGUE.

MR. A. WENGER: Was the make of creamery butter larger in Canada last year than the year previous?

MR. SPRAGUE: The make of butter was somewhat larger from the fact that the pasture was better.

MR. WENGER: Were there any more creameries or any more cows?

MR. SPRAGUE: I do not imagine so; there were the same number of creameries.

A MEMBER: What temperature do you think cream should be ripened at?

MR. WENGER: I think the best results would be gotten from cream ripened at a temperature of sixty five degrees, and after ripened, cooled down to churning temperature and held at that temperature four or five hours before churning.

A MEMBER: How long before churning would you prefer to ripen?

MR. SPRAGUE: I would have the milk ripened three to five hours before churning, and I would take from four to six hours to ripen it, according to the condition of the milk and the surroundings of the cream.

A MEMBER: What do you call churning temperature? We consider 65° is low enough to churn.

MR. SPRAGUE: The churning temperature would be considered to be the temperature at which you would get the best results in churning in from 40 to 55 minutes. In some places the churning temperature established is 55°, and I would try the churn at somewhere between 55° and 62° if possible. This could be done by having the cream thick—that is more butter-fat—and by using less cream in the churn, and get better results.

A MEMBER: Why would you use less cream in the churn?

Mr. Sprague: So that I could get more concussion from the action of the churn revolving.

A Member: Is there anything in the fact of rich cream expanding?

Mr. Sprague: Rich cream will expand somewhat more than thin cream or poor cream. It is advisable never to fill the churn more than half full.

A Member: Would there be more butter-fat lost in the churn at 65° than there would be at 55°?

Mr. Sprague: If your cream was thin enough, or poor enough in butter-fat, to warrant your churning at 65°, and sufficient time used in churning, there would not. But if your cream was thick, and churning at 55°, you would get butter in too short a time. The conditions would determine.

A Member: So you consider that the lower temperature the cream could be churned at the better would be the result?

Mr. Sprague: Yes; that is up to a certain point, 55°.

A Member: Have you had any experience with pasteurizing milk?

Mr. Sprague: Not before it is separated; I prefer to pasteurize the cream after it is separated from the milk.

A Member: What kind of a starter do you recommend?

Mr. Sprague: I would recommend a starter prepared from pure skim milk which had been pasteurized. In being pasteurized 25 per cent. of pure warm water should be added to it, and the culture added to it and kept from one day to the next. Make each day for the following day, or each day for the following churning. Sometimes these things don't apply exactly to the private dairy in the way in which they are described.

A Member: The higher temperature you skim the milk at, the closer skimming you get?

Mr. Sprague: Yes, the higher temperature you skim the milk at the closer skimming you get—that is, the speed of the separator and everyting being considered, and you can skim more milk per hour because the milk flows more freely.

A Member: If that is the case, why not pasteurize the whole milk?

Mr. Sprague: It would take too much steam, and you would not get the good effects of the higher temperature after you left a certain point—say 100°. You heat the milk for two purposes, first, to liquefy it, or make it more fluid; and, secondly, to make a greater diffierence between the specific gravity of the fat and the other parts of the milk. This is done by the fat expanding more with the heat than the other parts of the milk, and this expansion only goes up to about 100°. After you leave that heat you do not get a corresponding expansion of the fat, and, as a consequence, no material effect from the separation.

A Member: Does butter fat separate as easily from milk heated up while going into the separator as it does when heated up a few minutes before?

Mr. Sprague: No, the butter-fat is not as good a conductor of heat and cold as the other parts of the milk, and, as a consequence, a certain length of time should be allowed for this expansion to take place. The fat does not receive the heat as quickly nor expand as quickly as the other parts of the milk do, and a few minutes should elapse from the heating to the desired temperature before allowing the milk to be put through the separator.

A Member: Will the pasteurizing of milk or cream have any injurious effects on the butter?

Mr. Sprague: No; it will have a decided improvement on winter-made butter.

A Member: Milk has to be heated in the spring of the year to about 170 degrees before it is given to the patrons, and, if that is the case, why not pasteurize the whole milk if you can get a closer skimming?

Mr. **Sprague**: You can pasteurize the milk for the patrons for feeding purposes with a much cheaper contrivance than you can pasteurize for butter making. It is not advisable to turn steam directly on to it, because you allow the water that you condense from the steam to go through the separator along with the milk. This water is of the same specific gravity as the cream, and it comes out from the separator with the cream, and the water that is being used in the boiler may not be particularily pure.

A **Member**: Why could it not be done with a tempering pan?

Mr. **Sprague**: It could be done, but what is the use?

A **Member**: Why could not the exhaust steam from the boiler be used for that?

Mr. **Sprague**: I do not think you could pasteurize it fast enough with the modern separators.

Mr. **Gray**: I think it could be done all right. We have ordered a steam pan for that purpose.

Mr. **Wenger**: I do not know that there is any particular objection to it, and I do not see any immediate benefit.

Mr. **Gray**: There must be some benefit from the machine skimming?

Mr. **Wenger**: The machine will skim close up to a certain point, and after you reach that point you do not get that benefit.

Mr. **Gray**: We get as close skimming at from 150 degrees to 160 degrees. We have tried separating at 70 degrees to 160 degrees with the two separators, the Alpha and the Reid's, and we found considerable loss of the fat with both machines at 75 degrees, and when we got the temperature up to 100 degrees, there was not much difference. But when the milk is heated up to 160 degrees you can't get a trace of fat on the milk at all from either machines. We find we get a closer skimming at that temperature

Mr. **Bell**: How much fat do you find on 150 degrees?

Mr. **Gray**: You can just barely see it on the neck of the bottle.

A **Member**: How much do you find at 85 degrees?

Mr. **Bell**: We have tested from 75 to 85 degrees, and ours ran from one to one-tenth.

A **Member**: Do you find your butter just as good when separated at 160 degrees as when you separated it at 80 degrees or 90 degrees?

Mr, **Gray**: We have no complaints.

A **Member**: Do you find the color as good and the grain and texture as good?

Mr. **Gray**: Yes, the color, grain and texture are good.

Prof. **Dean**: I think the explanation of why it skims closer at 160 degrees is this: In winter time, when there are a great many cows that have been milking at from six to eight months, the milk is of a viscous or sticky character, and as you raise the temperature you destroy this viscosity in it, and make it more fluid, more liquid. I think last year at the Creameries Convention, when we first advocated skimming at from 120 degrees to 150 degrees, the creamery men were skeptical, but I think the exeperience all over Ontario this season is skimming at a higher temperature; the higher temperature you skim at the better it will skim.

Mr. **Goodhand**: We find our butter has been equally as good, and our cream will skim closer, at a temperature of 160 degrees, and I find it better to have close fitting pipes in the receiving vat, and have,plenty of water in the pan so as to get this water perfectly hot and the milk going in there heats up readily. I think this is much cheaper than pasteurizing skim milk. I would like to know whether there is any danger of hurting the butter by pasteurizing the whole milk.

Prof. **Dean**: We have made a number of experiments this last summer in pasteurizing the whole milk before separating, and we find that by cooling the cream thoroughly before churning, for from three to five hours, keeping it at churning temperature, we never have any trouble with the body and texture of the butter. Some people who pasteurize find the butter soft and sticky, but they do not cool the cream properly before churning; and I think you can pasteurize the milk or cream, heating it up to 160 degrees, without any liability of destroying the texture, and you will improve the texture and body if you simply cool the cream well before churning. Pasteurizing gives a mild flavor to the butter, and the demand to-day is not for higly flavored butter. Pasteurizing gives a mild, sweet flavor which the butter will hold for a considerable length of time.

A MEMBER: Would it injure the texture of the butter any by cooling the cream down quickly after skimming?

Prof. DEAN: No. One or two of the boys in the eastern creameries had the cream turn thick. Anyone who practices pasteurizing will need to be careful, for if you have the cream ready to turn sour when you apply the heat, it will turn sour at once.

Mr. SPRAGUE: I find that pasteurizing the milk does not give the best results in creameries.

A MEMBER: Have you ever found that over-ripe milk will separate just as well at a low temperature as at a high temperature?

Mr. SPRAGUE: I have not.

A MEMBER: Providing you are churning at a temperature of 55°, what temperature would you wish your butter at?

Mr. SPRAGUE: 60° or 62°, perhaps, if the surroundings were very cool; the temperature of the room would determine that.

Mr. DERBYSHIRE: I believe 100° or 160° is high enough to skim your milk or cream. We have had a lot of trouble in the milk becoming sour before separating it. You could get perfect separation at 100°, and then you could pasteurize your cream and have the very best result. I would not heat it higher than 100°.

Mr. MILLAR: In a case that came to my knowledge, they were heating the milk in a large vat, and, after heating the milk, something went wrong with the engine, and four thousand pounds of milk went bad.

Prof. DEAN: You should only heat small quantities of milk at a time, no one should be so foolish as to run a big vat of milk up to 140° or 150.

A MEMBER: If the milk was old and you heated it up to 100° or 110° and then pasteurized the cream afterwards, would not the cream thicken?

Mr. DERBYSHIRE: I do not think it would thicken as quickly.

The President read a letter from Prof. W. H. Jordan, director of the N.Y. Experimental Station, Geneva, expressing his regret at not being able to be present, as promised.

IN AN ENGLISH DAIRY.

BY MISS LAURA ROSE, ASSISTANT AT THE GUELPH DAIRY SCHOOL.

My talk will be very simple; it is just a talk on what I saw in an English dairy. I had the pleasure of spending the summer of 1895 and 1896 in Europe. From May till September of 1896, I spent in the rural districts of Oxfordshire and the surrounding shires, which are perhaps the best dairying sections in England. All that I saw was new and novel to me, and I had ample opportunity for studying the different methods of farm life in England.

The English are slow, but they are equally sure; and from what I saw they get more real enjoyment out of life than we energetic Canadians do. The most of the time I was in a small quaint English town, or rather village—just a small village on an estate. One evening a lady friend called, and in course of the conversation said "To-morrow will be churning day." I told her I was anxious to see the English method of making butter, so she might look for an early call.

I rose next morning between four and five o'clock. As I threw widely open the latticed window, deep with its diamond panes, the climbing rose tree that reached to the top of the house, nodded a sweet "Good morning" to me. I was not long in making my toilet that morning, and soon I was walking down the avenue of majestic beeches, whose large gray green trunks reminded me of a huge elephant. I thought we had pretty trees here in this fair Canada of ours, but I had never seen trees before until I went to England. Often in my walks across the fields, when I came across an unusually large one, I used to see how many arm lengths it was around, aud I frequently found them four or five times round. That will give you an idea of an ordinary tree. The good English people saw me doing this and they could not understand it. I heard one of them remark that they wondered if trees were the only things Canadian girls had to embrace. (Laughter.)

Then I walked down the quaint street, and past a row of straw-thatched cottages, but I could not go by without looking over the *low* wall in this case. For I do think the English are cruel in building such high stone walls that shut in and shut out the view. This wall was low, and I leaned over and admired the beautiful flowers and inhaled the fragrance. We could well take a lesson from the English in beautifying our homes. The humblest cottage there has its well kept flower beds. Then I crossed the village green—we have all read of English "village greens" that every hamlet has. I have seen boys playing cricket on it till nine o'clock at night, the twilight is so long.

Then I stepped over the style into one of England's permanent pasture fields, the sod of which has never known a plowshare. The Oxford Down sheep rose at my approach, and shook from their backs the dew. A few cattle were already grazing, and I followed the path by the well kept hedges, and after crossing over fields and many stiles came to the house of my friend.

I found her in a toilet all ready for work. By half past five the cream and the pail of cool water were strained into a large barrel churn with dashes inside, and it was set slowly revolving by horse-power. During the hour and a half that the butter took in coming I had breakfast, asked questions and looked around the dairy.

All the dairies in this part of the country were built of stone and had stone floors and thatched or slate roofs. The thatched roofs have the advantage, I believe, over the slate in being cooler in summer and warmer in winter, but they are in constant need of repair.

The maid was busy scouring with sand the empty leads for the new milk. These leads were arranged around the side of the dairy and down the centre, sixteen in all. Each lead measured 5ft. by 2½ft. and 3in deep. They were made of wood and had a heavy lead plate over them. There is a small open hole at one end to let out the skim milk when it has been skimmed for the last time. For those good English people set their milk, allowing it to stand twelve hours, and then skim with the old fashioned perforated skimmer. Then after they skim it once they let it stand twelve hours more and then again skim the same milk. They let it stand twelve hours and they skim again, and then twelve hours more and they then skim the milk for the fourth and last time. I tried to convince them this was not necessary, and I think in one case they reduced it to three times. I will say that the milk after being skimmed four times looked blue and I would like to have sampled it, because I think the constant stirring was not good for the cream.

They were milking a herd of twenty-four Shorthorn cows. The cows were brought in from the field and tied in the cow-shed, to be milked by the shepherd and the cowman. They always keep a shepherd in the old country, and he goes out twice a day and counts the sheep no matter where they are on the farm, and I have heard them say, "Have you your shepherding done?" The cowman and the shepherd came into the dairy about six o'clock, they had on their milking coats to protect their clothes, and these coats being linen could be frequently and easily washed. They had wooden yokes on their shoulders, and each carried two huge buckets of foaming milk.

But to return to the churning. I asked my friend if she used a thermometer and she said no. At last the man who had been watching the horse was told to stop it as the butter had come, not in the granulated form but in one large lump. The maid drew off the buttermilk, and as I wanted to see where they put the buttermilk, I followed out in the same building and there was a huge hogshead sunk in the floor in the wall so that part could lift up on either side. They lifted up the lid and poured in the buttermilk, and the pig-pen being on the other side, they could lift up that end and feed the pigs. It was decidedly handy, but I thought it in rather close proximity to the dairy. But I will say that they did not seem to have any idea how butter can absorb odors; they did not keep their cream crock or tank covered. Then the water was turned on and the butter washed and allowed to stand, and then the maid lifted the butter out with her hands. It was a large churn with a small opening, six or eight inches in diameter. She lifted it out into a kibble, a large wooden pan, and then the next operation was something I had never seen before and the cold chills ran up and down my back. They divided the work, the maid and the mistress, lifted it out and they sprinkled on a few handfuls of salt, and [illegible] sixty pounds of butter. You could hardly trace any salt in the butter, and [illegible] covered it up at one end of the kibble and took off a chunk of about ten pounds [illegible] commenced vigorously working it with their hands. She told the maid to bring in a [illegible] hot water, and I wondered what that was for. She dipped her hands in that hot [illegible] and then started again, that was to keep the butter from sticking to her hands. [illegible] she had it all vigorously kneeded, she measured it into pounds and rolled it into balls and then pressed it into Oxford prints, the prints six inches in diameter, circular and finished at the top and about an inch in thickness. Now that is the only form that butter will be received in, in the Oxford market; you could not dispose of a pound of butter in any other shape there While at Banbury, a few miles distant, they would not buy an Oxford print, the market there demanding plain rolls. That shows you the conservativeness of the English. I do not approve of the Oxford prints, it is not a handy package to market, and moreover that was such a surface of butter exposed to the air. After the butter is all moulded it is left till next day, when it is backed in large wicker hampers with wet cloths laid between the rolls and sent to market, where it brings from ten to twelve pence per pound

Shortly after my arrival in England, I was invited to a tennis party at one of the large farms, and during the evening we heard a buzzing noise, and one of the gentlemen said, "That is the cream separator, would you like to see it?" I said "Yes, I would be delighted," so he led the way to the dairy. Now I suppose he thought I knew nothing about a cream separator, coming from Canada As soon as I went into the dairy I said, "Why that is an Alexandra, isn't it?" And he said "Yes, do you know anything about it?" I said "Yes." That was just after I had taken a course at the College, and I was well up in separators then, and able to answer all the questions he put to me. So after he was through catechizing me he looked me up and down and said, "Do all Canadian girls know as much as you?" Of course I assured him they were all very clever, but I can tell you I would have been most ignorant had I not recently taken a course at the Agricultural College.

I went to visit a cousin at Gloucestershire, and he knowing the interest I took in farm life, asked me if I should like to see the dairy on the estate, owned by the lord of the manor. I said nothing would give me more pleasure, and he took me down. When the good-natured little English woman who had charge of the dairy heard of our mission, she most gladly led the way to the dairy, and I can assure you I spend a most pleasant hour looking around it. The lady and her two daughters made the bread and butter and raised all the poultry used on the estate; that was their special work.

In the first room we entered there was a table; and on it was piled loaves of brown and white bread, and although I say we make better butter than the English, I am sure they make better bread than we do. From this room we went to the basement, and from that was the dairy proper. The floor and walls are all tiled with small blue and white tile; around the sides of the wall were marble slabs forming tables, on which sat the milk pans and around the room the floor was sunk, forming a trough in which ran a stream of rich spring water. You have now an idea of that dairy. Blue and white tiled walls and ceiling, marble slabs for tables, and then the stream of clear water running in under the tables.

I was surprised to find that they made nothing but Devonshire butter. This woman said she liked the sweet milk to make sweet butter; she told me just how she made it She allowed the milk to stand twenty-four hours in rather deep tin pans, then she led the way into the room where the bread was on the table, and in the corner of this room there was a large tin pot built in over the fire place which was always filled with water nearly to a boiling point. The pans of milk were set in this kettle and allowed to just have the cream wrinkle on the top, and then lifted out and another pan put in, and so on till it was all scalded. It was then allowed to stand twenty-four hours more and then skimmed into a crock and just stirred with a spoon, and the butter came in a few minutes. After that it was lifted out and washed in the kibble and worked with our old fashioned butter worker. I said, "I am glad to see you don't touch it with you hands," and she said, "No, I never touch it with my hand" The butter is made every morning and worked up a night, and sent up to the great house for dinner; they have fresh butter every day. She said, "My dear I wish you had come just half an hour sooner, because we have sent up a platter of such beautiful butter."

She showed me the moulds she had used, some of them were just individuals and were small; they had the crest of the family on top. There were half pound prints, and I have no doubt, judging from the butter I saw there, would be very nice. That is what I saw in those two English dairies.

Before I take my seat I am going to mention the dairy course at our College. I have taken a course myself, and I know what a pleasure and benefit it has been to me—How it has increased my interest in life in almost every branch; and I feel that this Institution has not been brought sufficiently before the farmers' wives and daughters of this Province. I am glad that this year we have a large class of young ladies, and we hope to have still more. If there are any of you gentlemen who have daughters or wives who want to learn the art of butter-making better, you can send them there. I think in every case there is room for improvement. I feel that I have much to learn myself. If you have wives or daughters anxious to improve themselves and you send them to Guelph, I can assure you we will do our best to make their stay as profitable and pleasant as we can. And we extend a most hearty welcome not only to send your daughters and wives, but to come yourselves and see us. (Applause.)

OUR AGRICULTURAL WEALTH.

By Mr. C. C. James, Deputy Minister of Agriculture for Ontario.

I do not think that it would be advisable on the present occasion to preach a sermon to you from the text that "The love of money is the root of all evil." At best, I hope that if it is the love of money that has brought you here, no evil will come out of your gathering upon this occasion. There are a few words in the English language that have a peculiar force for many men. Now, here is one that suggests itself in connection with thinking over this subject, and that is the word "Gold." There are few words that have so wide an influence through all ranks and conditions of life. There is no other word that will start a man or stop a man, which will send him off in one direction or reverse his whole course, so much as that which is wrapped in that one word "gold." Not only

Canada, but also the United States, and in fact the whole world, has been electrified by it within the last two years, and we hear of fairy tales of great gold discoveries in the northwestern lands; we hear of people getting ready to move off to that land, chasing the rainbow to seek the fabled pot of glittering gold. Calculation has been made that next year ten or twelve million dollars will be taken out of the northwestern territories in the form of gold and brought back into the provinces and the United States. The larger portion will probably be taken to the United States, as more men will go from the United States than from Canada. Now, we have in Canada five millions of a population in round figures, and they hope to get at least ten millions out of the northwestern country. Two dollars each for the entire population of Canada is setting the whole world crazy. Just stop and think of that—$2 each for the whole of Canada is setting the whole world in a ferment. Then you say if that is all there is to be got out of it, how is the country going to be benefited by these wonderful discoveries? It is not the $2 a head that is going to make this country richer, because it may cost more than $2 a head to get it out. Taking the world over, it has been computed that it costs more than $1 to produce every $1 recovered. We hope our great transportation companies wil[illegible]ted, that they will have enormous crowds to carry, that the people will be dr[illegible]om Europe, that the farmers of Ontario and the Northwest will have to pr[illegible]d to supply them.

[illegible] were to tell you that in connection with some other industry there could be [illegible] into Ontario alone, and controlled by our people alone, ten millions of dollars t[illegible]ld be added to the wealth of our country, and if I were to state that in the newspapers, I suppose nobody would read it. Some persons would read it, and very few would believe it; yet we have right here, in connection with this industry, the possibility of adding to the wealth of this country many times more than will be added next year, the following year, or for many years to come, in connection with our great northwestern gold mining interests.

Golden Grain. We have in the Province of Ontario devoted to the production of staple grain crops six million acres given to the growing of oats, wheat, peas, rye, buck-wheat, beans, barley and corn. Last year (1897) this six million acres of land produced a total of one hundred and fifty million bushels of grain, worth at least fifty million dollars. Now the question is, is there a possibility of increase or improvement without any great outlay? If we can add one bushel per acre to the produce of Ontario—that is if this six million acres of land would produce on the average one bushel more per acre—we would be adding to the total produce just six million bushels. If we could add two bushels on the average we would be adding twelve million bushels. Now, I do not think the addition of two bushels per acre to the average produce of Ontario is out of the question, although we do produce on the average more than the United States. Yet, in comparison, or in contrast, with the old world, where lands are well worked, as in England, France or Germany, our average produce is very much lower. Looking at the older countries, where a better kind of agriculture is carried on, two bushels per acre added to our produce is still within our reach. That would be an advance of over ten per cent.; ten per cent. added to fifty million dollars means a sum total of five million dollars. In looking up this question I considered some of the experiments we have carried on in connection with the Agricultural College at Guelph, where wheat, barley, oats and peas were sown upon the land just as farmers ordinarily sow the grain. Two sets of plots were worked. On one set of plots well selected, plump, first-class grain were sown; upon the other inferior grain was sown, grain that had not been selected, or not hand picked, or chosen as first-class. It was not the poorest grain that could be got, but grain below the average. Here these were grown side by side, samples of wheat, one first class, the other second or third class; there, oats; yonder, peas and barley. Now for the results: good wheat gave 18.4 bushels per acre, and poor seed 14.7 bushels, a difference of 3.7. That is an increase of at least twenty-five per cent. Barley 39.3 as against 36, a difference of 3.3, an advantage of very nearly ten per cent. Oats, 50.5 against 44, and increase of 6.5, or about fifteen per cent. of an improvement. Peas, 38 as against 36, an increase of 12, or the good peas gave very nearly five per cent. more of a product than the poor seed that was sown. Now, I contend, and I think the experiments will bear this out, that if extra care were taken in the selection of seed sown by the farmers of this Province, the total produce would be at least ten per cent. better than it is at present time, and if the farmer would see to it that he sowed only the best varieties he would add another ten per cent. Another five per cent. could be added by improved cultivation and care of the soil. I think it is within the range of possibility to increase the production of grain in this Province by twenty-five per cent. It cannot be done in a day or a year, perhaps not in five years, but the advantage of twenty-five per cent. in the annual grain product of this province would mean an increase of ten or twelve million dollars worth of material along one line alone.

Golden Fruit. There is gold in our fruit as well as gold in our grain. I know there is no other part of the North American continent adapted to so great a variety of fruits as is this older portion of Ontario. If you take the map and examine it carefully you will find that the Province of Ontario is right in the line with the great producing States of the Union. In addition to lying in the right belt of the continent we have the best situation because the older portion of Ontario is washed by the waters of the great lakes, and is well watered by an extensive series of smaller lakes in the background Our situation is most favorable, and as a consequence we can grow the apple to perfection, and pears and plums and cherries and grapes, and in many sections we can grow the peach, which perhaps is the best test of our ability as a fruit growing country. In fact, without excepting any country in the North American continent, there is no other section where so great a variety of fruits can be grown to perfection as here in the Province of Ontario. I shall merely refer to the production of apples. In round figures we have six million apple bearing trees in the Province of Ontario. The number seems large, but we have two hundred thousand farmers and cultivators in this Province, and that would be an average of only thirty apple trees apiece.

What are the apple trees worth to the farmers of the country? Would fifty cents a tree be too low for the product of these six million apple trees? I doubt that very much. I doubt if our apple trees average a return to the farmers, year in and year out, of fifty cents a tree, though here and there you will find a man who will make several dollars per tree. Supposing we could produce an average of a dollar a tree, that would be six millions. Supposing we could produce two dollars a tree, that would be twelve millions. Some men get five, six, seven, eight and ten dollars' worth of apples from a single tree. What causes the difference? They have, in the first place, apple trees that produce the variety that is desired by the great consuming public. Their trees are of the right class to start with, or else they have grafted them with varieties that were marketable. In the second place they have taken good care of these trees, and they have added to the value of the produce by carefully spraying. I believe that if the farmers of Ontario would carefully spray their apple trees the fruit product of Ontario would increase by a million dollars. We published the other day in connection with our Department an expression of opinion from thirty of the orchardists in this Province, men who are growing apples, some as a business and others as a part of their farming operations. They were asked to tell us what was the result of spraying in their orchards. If any of you are interested in that line I would strongly suggest that you send for a copy of that report and read what these men say. I have jotted down here one statement to show what attention to one detail in connection with this fruit industry means. Mr. G. W. Adams, of Smithville, had an orchard that was partly sprayed. Eight trees were sprayed and three left unsprayed. He had eleven trees apparently the same kind and of equal capacity and equal value. What was the result? The eight trees that were sprayed gave twenty-eight barrels of apples. that sold for $64, or $8 each. The three unsprayed gave six barrels that sold for $7.25, or less than $1.25 each. That is, the sprayed trees netted that man $8 each, and the unsprayed $1.25. You may say that is an extreme case, and yet we have all over the Province results of a similar kind. Out the difference in half; there is the case of a man whose trees unsprayed netted him a little over $1, and the trees that were sprayed increased his yield from $1.25 to $8, and it cost him only twenty-five cents per tree besides his own time. So I say that if we could bring our apple orchards on the farms of Ontario into proper bearing, by regrafting the poor ones with good varieties and by taking proper care of these trees, the 6,000,000 trees would yield at least $2 apiece, and in that way it will be quite easy to add from $5,000,000 to $10,000 000 to the produce of this Province with but very little effort. Where is our fruit to go? With proper transportation facilities we can send it to Great Britain, and to Manitoba and the Northwest, to say nothing about the possibility of trading with the western states.

The Poultry Industry. The next gold mine I would like to show you is that in connection with the poultry industry. I have a few figures which I have taken down in connection with the productions of the United States in the year 1896. In that year the gold crop was worth $47,000,000; silver, $73,000,000; tobacco crop, $36,000,000; the potato crop, $79,000,000; the oat crop, $164,000,000; the wheat crop, $238,000,000; the cotton crop, $259,000,000; *the poultry crop (eggs and poultry marketed) $290,000,000.* That perhaps may seem startling at first. The poultry crop in 1896 was just six times the gold crop of the United States. We go crazy over gold, but we do not go crazy over eggs and poultry, and yet for every dollar that was added to the wealth of the United States by gold six dollars were added in the shape of eggs and poultry. That shows you how small things in the aggregate make an enormous amount. Here is a point I contend we are not looking after in the Province of Ontario. I have estimated in Ontario the eggs at $1,500,000 and poultry at $1,000,000. If markets could be developed and foreign markets opened, there is no reason in the world why our eggs and poultry business should not be doubled and trebled, and we can add from $2,000,000 to $4,000,000 to the annual output of the farmers of this Province.

Golden Cheese and Butter. Sixty thousand patrons sending milk to the factories of Ontario this past year produced about $12,000,000 worth of cheese—that is an average of $200 each Now if we can find markets for cheese it would not be a very difficult matter to make that $200 each $300 One hundred dollars added to every one of these farms is quite within the range of possibility. It would add $6,000,000 to our income. Someone might say this would overcrowd and upset the cheese market; if that is so the same thing cannot be said of our butter. We produced from 60,000,000 to 70,000,000 pounds of creamery butter, and about 15,000,000 pounds of dairy butter. Now, the possibilities of the creamery butter are so great that we need not stop to consider their limit just at the present time. It would not take very much increase to bring, say $50 apiece more to these farmers in the shape of creamery butter, and it would not take very much to increase it by $100 or $150. The increased return would be something enormous. We have 200,000 farms, large and small, in this Province, and about 175,000 farmers, in addition to whom there are owners of small plots for the production of garden produce.

If these 200,000 farmers could so develop their work that they could produce annually $100 more, whether it is by using better varieties of grain, or by more carefully selecting their seeds, or by growing crops that are more valuable, or by keeping better stock, or by taking better care of their stock, or by looking after their orchards, or by increasing the output of their milk cows; if by all of these means brought into operation they can add annually $100 a piece to the farm produce of this Province, there would be added to the total wealth of Ontario annually $20,000,000. Now I have not given you any exaggerated figures; I have in every case tried to keep well within the possibilities of the case. It would not take a very great development in the agriculture of this Province to increase its income, or to increase the value of the products, by at least $20,000 000. This work is going on; it is coming gradually. How is it going to be brought about? Is the Government going to do it? There are certain duties which the Government has to perform, but it cannot of itself produce wealth. There is no government, never has been, and never will be which of its own operation could add $10,000,000, $15,0000,000 or $20,000,000 to the annual produce or to the incomes of the farmers of this Province. Can this society to it? This Association for a great many years has been doing a very valuable and important work, and I trust it will continue to do a valuable work; but this society has but small means of bringing about that work. The work of the Government and the work of this society can be a factor simply and solely as it stimulates one by one the two hundred thousand farmers throughout this Province, and the sixty or seventy thousand dairymen throughout this Province, that each man shall do his best and add his small amount to this total. We sometimes read that some man has come back from the gold fields with forty or fifty thousand dollars, and perhaps forty or fifty who went back to the fields with him leave their bones by the wayside, or come back empty handed and discouraged.

What would be the effect of adding $20,000,000 a year to the farmers' incomes? I leave it to the business man and I leave it to you. The man whose industry is the basis of all industry—the man whose prosperity is the basis of all prosperity—is going to do this work by saying, "I can get some value from an Association of this kind; I can read their reports and see how butter and cheese can be made; how an increased amount of milk could be produced by improved methods of feeding. I will take the various reports published by our Agricultural Colleges and I will look over them carefully and see the experiments that have been made. I am going to take this report, and see what our Government is doing for the large amount of money that is being spent."

Now let us take these reports and go over them carefully and see what results have been obtained; let us see whether there is anything either in the way of varieties of grain better than we have been using, or as a method of growing. Attend the Farmers' Institute meetings, and get all the information you can; come to the meetings of this kind and present your difficulties and have them solved. It is only by individual efforts that this great amount of wealth can be added to our Province. Not by resolutions passed by meetings of this kind, but by each one of the great producers going to work and putting intelligence into his work, carrying on his work in a systematic and energetic manner. and carrying on that work having but one object in view, the improvement of himself and doing the best he can. By so doing we can add to the great wealth of this Province and attract to this industry more attention on the part of the great masses of the people. This country will become wealthy and prosperous, not by the enrichment of a few millionaires but by the general prosperity of the whole agricultural community.

Mr. Derbyshire: I have always been a strong advocate of our Agricultural Colleges and our Dairy Schools, and I have been more than justified in my claims for these institutions by the address made to-night by Miss Rose, one of the students of this College, which shows what every woman in the realm could do by attending this Dairy School. I am sure all of us must take a deep interest in the dairy education of our people, and I believe no place is calculated to give this education better than the Ontario Agricultural College. I have been at a number of institutions of this kind in the United States, and I am delighted to be able to say to you to-night that the best Agricultural College on the continent of America is in the city of Guelph; and I think a great deal of credit for these institutions, and especially Dairy Schools at Guelph and Kingston, are due to their being advocated by our Dairy Association. We have seen from Mr. James' address the great increase of the wealth of this Province that could be added in a single year by better equipment. I am glad to say that in the last year we have availed ourselves of these things that have made 63,000 tubs of butter more, or $800,000 worth more of butter than we did the year before in the Dominion of Canada, and 370,000 more cheese, so that we have increased the wealth of this Dominion in the butter and cheese exported nearly four millions of dollars, and I claim this work could go right on indefinitely. A great many claim we are going to overdo the business. I remember twenty years ago, when we commenced to manufacture cheese, some people came around and said, "You are going to overdo the business;" but we have increased the quality, and every year there is a better demand for the goods, and I believe we can continue the same work indefinitely if we produce a better quality of goods. The Province is adapted for it in every way, and if we have the educated people who carry on work on the farms, I believe that, with the aid of our Dairy Schools, and by having the factory system enlarged and improved, we can increase four million in the next year. I believe that, if we can add four million a year to our wealth in this particular item, it would so stimulate every other person that they would improve their orchards and their grain fields, and we would have an influence shedding out from these associations, and every person in the Province would be benefited. I believe the Dairy Association has been one of the greatest organizations for good in this country, because our influence has been felt in the land. We have made a finer quality of goods in 1897 than we ever made, and I believe that from the influence of this Association and our Dairy Schools a finer quality of goods will be made next year. How can it be otherwise when we see that our Dairy Schools are full of the bright, intelligent men of the Province. I believe a great many men here will take advantage of these schools and, if they do, they will go home with a determination to do better, and with the ability to carry it through successfully. I am glad to say that our winter dairying movement is going right along, that we are improving our factories. We have made four times as much winter dairy butter in this Province last year as we ever did before, and of a finer quality, and I believe we can increase. We are only furnishing a small proportion of what the mother country demands of us. Our factories should have a first-class man in charge. We must look carefully to this butter business, because we can extend more largely in the butter business than we can in the cheese. I am sure that the meeting we have had here, and the meetings we are going to have, will influence a large number of people so that they will better their condition and their surroundings, and so that they will have their farms in better condition, and so that their factories will be in better condition, and and their stables better lighted and ventilated. It has been said there is plenty of room at the top. All the cheese that is made in this country is not of a fine quality; we can improve in our boxing, and in the flavor of our cheese; we can improve every solitary factory in this country. We are proud of the record we have had in the past, and I say we can improve on it; and I believe it is the duty of every man to do his very best, if not only for himself, for his country. I believe all of you will go home with renewed energy, and will be stimulated with the addresses you have heard here, and do better service for the country and for yourselves. Let the other nations and countries make the ordinary goods, but let us make the superior article. I won't take any more of your time up to-night, except to say that I hope you will all take advantage of an opportunity to visit the Dairy Schools at Guelph and Kingston. The school at Kingston has been doubled in the past year, and has been equipped with better machinery in every way, so that it is the pride of the east. It is carried on by the best men that money can hire, and our Guelph School is equipped in the same way.

A PRACTICAL DISCUSSION.

Mr. JOHNSTON: I would like to ask the instructors if they think the work they have done has materially benefited the cheesemakers, and, if so, along what lines? I would also like them to give us some idea of their work with regard to the different lines or cheese made in the district, and under what process the makers were working, and who were working to disadvantage. I think myself the work of the instructors is an important thing, and I want to get the best results from the instructors we employed.

Inspector CLARKE: I think the majority of cheesemakers benefitted. Some of them would not listen, but a few of them took a great deal of interest in it.

Mr. JOHNSON: I would like Mr. Clarke to tell us what the main faults were.

Mr. CLARKE: A lot of them were adding steam too quickly after they cut in the vat, which caused their curd to be harsh; it lost that silky feel.

A MEMBER: What time would they heat it up in?

Mr. CLARKE: Some heated it up in twenty minutes, some in half an hour, and some in twenty-five minutes.

A MEMBER: How long do you think a vat should be heated up from the time it is cut until the steam is cut off?

Mr. CLARKE : From forty-five to fifty minutes.

A MEMBER : Do you advocate heating with dry steam or water

Mr. CLARKE : I prefer water.

A MEMBER : In your district was heating by water adopted?

Mr. CLARKE : Not very largely; there was no water in the district.

A MEMBER : Was that the fault of the cheesemaker or the director of the factory?

Mr. CLARKE : They had no water; a lot of their water was soft water. They just had deep cisterns. If they bored down through the rock they could not use the water because it would be salty.

A MEMBER : What was the soft water like?

Mr. CLARKE : It had been there so long it got hard; there was no bad odor, but it had a soft taste.

A MEMBER : How were their cisterns constructed?

Mr. CLARKE : All soft wood, pine.

A MEMBER : Then the water would be bad I am sure.

Mr. CLARKE : It did not appear to be; I had to drink it. There was no other water there to drink.

A MEMBER : The factories that were scarce of water—how did they manage to keep the factories clean? Did they use anything?

Mr. CLARKE : No, they did not. I got some of them to use whey, when they were short of water, to clean the driers.

A MEMBER : What did they do for water to set their milk with?

Mr. CLARKE : They would use that same water. Sometimes they would go quite a way to a neighbor's well for water.

A MEMBER : Do you consider the cheesemakers should be considered responsible for bad flavors in the cheese, if they had to use water like that?

Mr. CLARKE : I suppose if there was any trouble they would be held responsible. I do not think there were, I did not hear of any. If their cheese was badly made, then they would be held responsible.

A MEMBER : Did they use this water that you say was not good water for setting their vats?

Mr. CLARKE : Some of them did.

A MEMBER : Was the cheese good?

Mr. CLARKE : Not as nice as they make in the north.

A MEMBER : How many factories did you find in your district that had good spring water?

Mr. CLARKE : Only two.

A MEMBER : I would like to ask Mr. Millar how long he would recommend to handle the curd before turning on steam after cutting?

Mr. MILLAR : That would depend something on the condition of the curd and how quickly it was going to work. Providing it was good milk, I would say from ten to fifteen minutes. What is your own opinion?

A MEMBER. That is what we think—from ten to fifteen minutes; and we take three-quarters of an hour to heat it.

Mr. MILLAR : You would have your vat dipped what time from setting?

A MEMBER : Two and three-quarters to three hours.

Mr. MILLAR : That is about the method I have been trying to adopt for the last two or three years. Take from two and three-quarters to three hours, and after cutting the curd stir it fifteen minutes before applying steam, and heat slowly for the first ten or fifteen minutes, and by all means be careful not to break or smash the curd in handling. I think a good deal of our rough texture cheese comes from over-ripening the milk before setting, and then heating quickly and handling the curd roughly. With regard to heating the milk or curd with or without water, I approve using water. But the great majority of the vats through the country are not fit to hold water; they are so poorly made that they would leak. Manufacturers should provide better vats; but they never will until the cheesemakers insist upon it.

A MEMBER: Did you ever try heating with dry steam when the curd sticks to the bottom of the vat?

Mr. MILLAR: Yes; you will notice that very frequently.

A MEMBER: Don't you think that would injure the flavor?

Mr. MILLAR: I think it would; some parts of it would be scorched.

A MEMBER: Did you ever find that where they used water?

Mr. MILLAR: Not unless you got the water very hot.

A MEMBER: Do you prefer using very much water or just enough to cover the pipes?

Mr. MILLAR: I would have more than that; have it up probably two or three inches on the pan.

A MEMBER: How much would you prefer, Mr. Johnston, in your vat for heating the milk or curd?

Mr. JOHNSTON: We generally have enough water in the bottom so that it overflows. When you have not enough water your curd runs up too high after you cut the steam off. I prefer plenty of water in my pan for heating.

A MEMBER: My experience is the more water you have in your vat the more your curd will run up.

A MEMBER: That has been my experience, too.

Mr. JOHNSTON: That is not the case with us. I do not know whether the construction of the vat has anything to do with it. Our pipes are close to the bottom of the pan. I think that matter depends a good deal on the construction of the vats.

The CHAIRMAN: I would like to know Mr. Millar's system of setting, and when he cuts the curd?

Mr. MILLAR: We prefer to set the milk so that it will remain in the vat from two and three-quarters to three hours, using sufficient rennet to have it coagulate in from thirty to thirty-five minutes, and allow the curd to become quite firm before cutting. One mistake I find that a great many cheese makers are making, is that they cut the curd while soft, and get it broken up and expel too much moisture. I visited one factory in the season of 1896 and the cheese were as dry as bricks, and the cheese-maker said he was doing everything in accordance with our instructions. I just watched him cutting his vat, and I said "Do you cut your vat now?" He said "Yes." I said "You had better let that vat stand from five to ten minutes before touching it." As soon as he cut his vat he put the rake in. The consequence was that his cheese were just like bricks, and it would take six months of hot weather to break them down. I stayed with that man two days, and he made fine cheese from that time on, and he told me himself, afterwards, that the whole trouble was from cutting too soon and stirring. We cut with a horizontal knife first, and then cross-wise and length-wise with a perpendicular knife; if it has worked fast we give it an extra cut.

The CHAIRMAN: After cutting the first time do you let it lie?

Mr. MILLAR: No; we prefer letting it stand a few minutes afterwards rather than between the cutting.

Mr. JOHNSTON: Do you find agitators in many factories, and do you approve of using them?

Mr. MILLAR: I approve of them, but I do not find that many factories use them, and in some factories you find them laid away in the store room. I would recommend agitators in every case.

The CHAIRMAN: I find a great many cheese makers differ from me in reference to stirring the curd. They think it should be cut in a soft state and handled gently. My own experience was to that effect. I thought the softer I cut my curd and the quicker I could work it gently with my hands I had a more gentle curd.

Mr. MILLAR: The sooner you cut the curd the more moisture you will expel, and in many cases you expel too much moisture. I prefer using the hands for the first ten or fifteen minutes.

A MEMBER: How long do you stir before you add steam?

Mr. MILLAR: Ten or fifteen minutes.

A MEMBER: Providing you had agitators, would you stir with the hands once?

Mr. MILLAR: No, I would put the agitators in at once and run them well and steady, and increase your speed gradually. If the curd had been heated twenty or twenty-five minutes, take out the agitator, draw out some of the whey, and stir with the rake. I do not approve running the agitators all the time till your curd is ready for dipping.

A MEMBER: That would be an objection?

Mr. MILLAR: In many cases you get your curd too dry.

A MEMBER: You would not rake it very often with the rake?

Mr. MILLAR: It would depend on the condition of the curd; if it was firming up, I would just rake it often enough to keep it from matting together.

A MEMBER: If the curd is getting too firm, cannot you overcome that by not heating so high?

Mr. MILLAR: Yes, but you have the temperature up at that time.

A MEMBER: What is your opinion of starters?

Mr. MILLAR: My experience with starters has been very bad, taking the whole country as a rule. A great many cheesemakers have an idea that if they use five or six hundred pounds of starter to a vat, they are going to get out early, and the boys are trying to see who can get out first. If you use a large amount of starter, the chances are that your curds will lie in the sink a half hour longer than if you did not use a starter. I went to a factory where the maker was using a large amount of starter and the curds were working slow in the sinks. And I have taken curd alongside without any starter, and they would mellow down a half hour sooner, and by that means I have convinced many makers that starter is a bad thing in the warm weather. I think there are times in the fall when it could be used to advantage.

Mr. ROBERTSON: Do you think starter has anything to do with the mottled color of cheese?

Mr. MILLAR: That is a question I am not very clear on.

Mr. RUDDICK: We have had some experience with mottled cheese. The cheese I refer to were affected with a certain kind of germ. I do not think the starter would have anything to do with cheese being mottled. I think that is caused in the handling of the whey, allowing it to remain in large sized lumps of the curd, the whey not being evenly expelled. If the whey is allowed to gather into lumps before being heated, and these lumps never broken up, the salt does not penetrate to the same extent.

A MEMBER: What do you say as to a curd that had been cooked properly and kept in a granular form, and was then discolored?

Mr. RUDDICK: I would say the origin of that was bacterial. Those of you who have been reading English dairy literature, will notice that they have had considerable trouble in Scotland and England with this discolored cheese. Prof. Dean introduced the matter down at Lindsay the other day, and he showed that certain germs had got entrance in the cheese or to the milk in the first place and were causing this disappearance of the color. In their experience, the starter overcame that difficulty, because it provided a more vigorous growth to the different class of germs which overcame these which were causing the trouble.

A MEMBER: Is not the color of cheese affected by the curing of it?

Mr. RUDDICK: Only so far as the uneven distribution of moisture would cause it.

A MEMBER: What is the best way to prepare starter?

Mr. RUDDICK: I believe the very best way is to select the very best milk you can get.

Mr. BALLANTYNE: Is not that often unsafe?

Mr. RUDDICK: I think it is.

Mr. BALLANTYNE: Cannot you use pure culture?

Mr. RUDDICK: Our experience with pure culture is not satisfactory. There are a great many men who abuse the use of starter, but at the same time I am fairly convinced that the judicious use of starter is a good thing. I am satisfied that in the hands of a careful man it will produce good results, and I have no hesitation in recommending the use of a starter to a man who will be careful. The starter means that you just propogate what you put in the cheese. Twenty years ago, in this country they used to take whey out of the whey tank and call that a starter, and they used to leave whey in the can and let it sour and call that a starter. There are two uses for the starter. One is to hasten the ripening of the milk, and the other the overcoming of some of the objectionable flavors that are in the milk.

To prepare a starter, take the very best milk that comes to the factory and warm it to a temperature of 80° or 90°. Keep it protected. Some make the mistake of putting it into a milk can that has not been washed. You should have some special can so that it can be protected. Allow this milk to turn sour. After it turns sour it is a very good plan to add a certain amount of water to the milk to prevent forming too hard a curd. To make colored cheese, it is necessary to put a little color in the starter.

A MEMBER: Don't you think color in the starter affects the flavor of it?

Mr. RUDDICK: No, I do not think so; no more than using color in the cheese. I think color in cheese affects the flavor, and I believe the best flavored cheese are white cheese.

Mr. BALLANTYNE: You said you did not believe in pure culture?

Mr. RUDDICK: Some of the pure cultures which we have bought are of the rankest kind; they produce an undesirable flavor.

Mr. KEELER, (Forest): Do you ever prepare a starter from pasteurized milk?

Mr. RUDDICK: Yes, we heat the milk to 160°, cool it down to about 80°, then add a small quantity of the previous day's starter, or some milk that is sour, always taking care to use a good flavored starter.

A MEMBER: Do you add any water to the starter?

Mr. RUDDICK: About one-third or one-half; it just depends on the size of your vessel.

A MEMBER: In that pasteurized starter, do you make any more than enough for one day's use?

Mr. RUDDICK: Just enough for one day.

Mr. MILLAR: I would highly recommend pasteurizing the starter, and preparing pure culture from some milk that you know is right. Save a little from that every day and you can keep it up and have the same flavor for a long time. At the dairy school we do not get the best of milk, and we have taken milk that was very inferior. By heating it up to 160° and letting it stand half an hour and then cooling to 80° and adding a quantity of old starter, you can propagate the flavor, and in this way you can do good work. At the dairy school we never use more than one per cent. and very often one-third of one per cent. and one-half of one per cent.

A Member: What, in your opinion, is the cause of this discoloration in the cheese?

Mr. Millar: In many cases it is a form of bacteria that causes discoloration, and that is one of the reasons why I advocate carrying on experimental work in the cheese factories. When you find a man having difficulty, go to that factory and find out the cause, there must be some cause. I have seen several lots of cheese perfectly made that would be discolored when three or four weeks old.

A Member: Where do you find the discoloration?

Mr. Millar: In the particles of curd. I believe where you find it in the seams it comes from excessive moisture.

A Member: Is there any bad flavor from this cheese?

Mr. Millar: No; the color is the objection.

Mr. Robertson: My experience is that a mottled cheese almost always has a uniform bad flavor, a sort of sweetish flavor will go with it. I have noticed this in cheese that were perfectly made and of good body.

Mr. Millar: I saw three or four hundred cheese a year ago last October of which the flavor and everything else was all right except the color.

A Member: Do you ever find this mottling before the whey has gone off?

Mr. Morrison: Yes; you can always find the flavor just as the acid starts to develop on the curd in the whey.

A Member: Can you notice that flavor in the milk?

Mr. Morrison: No.

A Member: Do you think using pure culture has anything to do with discoloration in the cheese?

Mr. Morrison: No.

A Member: Would the feed the cows eat produce mottled cheese?

Mr. Morrison: It might, but I do not think that is the cause of it.

A Member: Does it make any difference in the spring when part of the cows are in the stable and part in the pasture?

Mr. Morrison: That was not noticed in the spring. It came later in the season.

Mr. Ruddick: I do not think that would make any difference. The milk would certainly be of uniform mixture.

The Chairman: What time in the season do we find this mottled cheese?

Professor Dean: I may say that some time last fall, about the end of November, a maker in Eastern Ontario sent me a sample of cheese that had that peculiar mottled appearance, accompanied by a flavor we had never noticed before. As far as we have been able to investigate this question, we have found that one of the things that may have created this trouble was that some of the patrons were feeding whey to the cows, perhaps they were short of water. I find in Eastern Ontario the patrons are giving whey to the cows instead of water. We have found that this peculiar mottled appearance does not occur in white cheese. We have put some of the germs that came from this cheese into a starter and made cheese from it, and the colored cheese showed thi mottled appearance and the white cheese did not. And that points to one remedy; if a man is troubled with that, let him make white cheese. Our bacteriologist is working on that trouble, and we hope before long to have some definite information on this very important question. Up to the present time it would seem as if this trouble arose from something that the cows ate, or that it had some connection with the coloring. It points in these two directions.

A MEMBER: I would like to ask Mr. Millar if there is any bad results from pasteurizing milk by putting a steam pipe right into it?

Mr. MILLAR: We have never practiced that, and I would not recommend it. I would much rather set a can of milk in a tank of hot water and heat it in that way.

Mr. BELL: I had a tank made on purpose for pasteurizing our milk. It is large enough to go inside an ordinary milk can with a space of two inches around for the hot water. We put the hot water around it, and it soon goes up to the desired temperature, 170°, and then we take it out and cool it. The can cost me $1.75.

Mr. MILLAR: What results have you had?

Mr. BELL: I cannot say that we have had the very best results, and I do not know why. Sometimes we find our starter from the pasteurized milk goes wrong, and we quit using the starter altogether. This fall we handled it a little different. A plan I have never recommended is, taking the milk out of the vat after it comes to the temperature for setting. Of course this can be done in the summer time, but we have had success in doing it that way in the fall.

Mr. MILLAR: What was the matter with your starter?

Mr. BELL: It would develop an objectionable flavor at times.

Mr. MILLAR: Then your culture was at fault.

Mr. BELL: The starter would be all right to-day, and using that same culture to-morrow it would be wrong.

Mr. MILLAR: How long did you leave it from the time of heating until you cooled it

Mr. BELL: Twenty to twenty-five minutes.

Mr. MILLAR: How much of the old starter did you use?

Mr. BELL: For seventy-five pounds we put in four or five pounds of the old starter

Mr. MILLAR: What temperature did you cool the milk to before adding the starter?

Mr. BELL: About 80°.

Mr. MILLAR: Was it in the hot weather it went wrong?

Mr. BELL: No, early in the spring. In the hot weather we did not use any starter.

Mr. MILLAR: Did you try cooling it lower, and using less of the old starter?

Mr. BELL: No.

Mr. MILLAR: Sometimes we found that by leaving the starter at a temperature of 80° and 85° it would go wrong. Then we lowered the temperature, and raised the percentage of the old starter, and apparently it was all right.

Mr. BELL: Why reduce the percentage in the old starter?

Mr. MILLAR: We get better results.

Mr. BELL: I have come to the conclusion that it is better not to use the starter at all.

Mr. DERBYSHIRE: We have plenty of good water in the east, and further I would like you to understand that we do not feed whey to the cows—an odd man is apt to do anything, no matter whether it is in the east or west.

Mr BALLANTYNE: I would like to say that we are not as well pleased with the work of the instructors as we should be I think possibly the desire of the instructors to be well thought of is one of the principal causes why we do not get as much benefit from their instructions as we otherwise might. I think if the instructor wants to make an impression on a cheesemaker he should get on his neck, and if he is a dirty man he should tell him so in plain English. I think the ordinary curd sink in use in this country is an abomination. I think the wooden sink that gets the nasty smell is an abomination, and the slats get the same smell, and the strainer cloth smells unless perfectly new, and even the best of them, after being hung on the line for twenty-four hours, will smell. I think we should try and get away from these curd sinks. Lately I have been trying to get manufactured for our Black Creek factory a curd sink that would not create this objectionable smell ; that would not be a tin-lined sink, but would be a tin sink

Mr. DERBYSHIRE : I would like to hear from Mr. Millar why he does not get on the neck of these cheesemakers?

Mr. MILLAR : Because when I go to the factory I go there with the desire to do the maker the most good I can, and I know if I "get on his neck" I will not be able to do him any good that day. If you are going to do any good you must judge your man when you start with him, and then work to the best advantage. Try and show him that there is a proper way of doing these things, and in that way make a better man of him. I would rather take off my coat and go into the vat with the man, and show him how I would make the cheese and how I would clean the factory ; and I can tell you I have taken off my coat and rolled up my pants and scraped the floors of some factories—and when I have gone back to that same factory I have found it in better condition, and that same man would give me a grip that would do me good, because I had helped him. Just as soon as the Dairymen's Association wants to hire an inspector who will get on the cheesemaker's neck, they will have to get another man, because I am not the man for them. (Applause.) I have known lots of men whom you could not tell that their cheese was wrong ; they would be so hot about it. I once told a man that his cheese was not suiting the buyers. He was so hot about it that he would not let me see his cheese, and would not let me into his curing-room. If I had gone in and worked with that man without saying a word about his cheese he would have learned something from me.

The CHAIRMAN : What about that cheese? (Pointing to a cheese on the platform.)

Mr. MILLAR : I would simply discharge the man that made it.

The CHAIRMAN : Here is a cheese that has a history. That is what I would call a "bird." That cheese was shipped as September, October or November cheese. The man who bought it bought the three months' cheese, and he found seventeen cheese like that in one of the car loads. I do not suppose he would have found them had not one of the farmers dropped the cheese off the wagon and he had seen it. I do not think that cheese is worth a cent a pound. After investigating the matter they found the cheese was made last April and was sold and shipped as September cheese. This one speaks for itself and speaks loudly. I think it is a great mistake, if cheese is rejected, to put it in and ship it. This cheese was sold to J. W. Cook, Ingersoll, and shipped up to me for inspection by the convention. He says that after these seventeen cheese were found in this shipment they went back to the factory to examine the rest of the cheese, and they found nine more, making twenty-six cheese in all of that kind that they had intended to ship as September cheese.

Mr. ROBERTSON : This cheese (referring to another cheese on the platform) was found in one of our ordinary good factories out of a lot of 250 boxes. This is the only cheese in the lot that was not well finished, and it is not a bad cheese inside. It is worth while for some of the makers to come up and look at it, and see how the bandage has not been able to adhere to the cheese at all. When I examined it, I found that they had tried to unite two cheese together.

Mr. BROWN : What is the objection to mixing up the curds?

Mr. ROBERTSON : I think it is better to make a small cheese and sell it to the patrons, because you are apt to have two flavors and two colors if you mix them.

A MEMBER : What is the cause of open porous cheese in hot weather?

Mr. MILLAR : Salting too early and putting to press hot. I think it should go to press at a temperature of about 80° to 85°.

BACTERIA IN DAIRYING.

Dr. W. T. Connell, Professor of Pathology and Bacteriology at Queen's University, Kingston, read a paper on "Bacteria in Dairying." This address will be found in the report of the proceedings of the Eastern Association.

THE CURING OF CHEESE.

Mr. John A. Ruddick, Superintendent of the Kingston Dairy School, gave an address on "Cheese Curing Experiments," a report of which will also be found in the proceedings of the Eastern Association. In introducing his subject Mr. Ruddick pointed out the importance of such investigations as those made by Dr. Connell, and welcomed the bacteriologists as a new helper in dairy work in Canada.

A Meeber: I would like to ask Mr. Ruddick what kind of a floor he would recommend for a basement curing room?

Mr. Ruddick: I think it would have to be a cement floor—and there are cement floors and cement floors. It seems to be a pretty difficult thing to get the average mason to make a proper cement floor. He apparently does not understand that it should be made like the sidewalks and the streets. I have seen a number of cement floors, and the trouble seems to be that they had not the proper foundation, or that the body of the cement is so thin that it cracks and breaks.

A Member: Do you think a cement floor, well made, will be a dry floor?

Mr. Ruddick: Yes, it is dry. No moisture will come up through a good granolithic floor.

Mr. Gurler: I find that it is only once in a great while that you can find a mason who it is safe to trust to put in a cement floor. When it is done properly it is a good floor.

NOMINATING COMMITTEE.

Upon motion, Robert Johnston, of Bright; J. W. Cook, of Ingersoll; S. G. Kitchen, of St. George; George Goodhand, of Milverton; and R. A. White, Foxville, were appointed the Nominating Committee.

PRESENTATION OF MEDALS.

The Chairman then presented the medals given by the Windsor Salt Co. to the successful competitors at the Toronto Industrial Exhibition and the Western Fair. In presenting the medal to the Owen Sound Creamery, the Chairman remarked that they employed a graduate of the Guelph School as churner, and he thought it was good evidence of what the Dairy School could do.

Mr. Struthers: I have very much pleasure in accepting this beautiful medal, and I trust it will encourage me to go on with the good work I have already taken part in; and I trust the good work of the Windsor Salt Company has commenced in our Province will also continue. I am sure the dairymen of Ontario will give them every encouragement. I had the pleasure of getting the first gold medal presented in Toronto at the Industrial, in 1892. Mr. Graham, of the Agricultural College, assisted in preparing this butter. (Applause.)

Albert Orchard was awarded a medal, and he also was a graduate of the Home Dairy Department at Guelph.

Mr. Bearman, buttermaker, is a graduate of Mr. Wenger's Creamery, Ayton, and was buttermaker in connection with the Travelling Dairy for three or four years, and it speaks well for the College and Dairy Schools.

Mrs. Burk, who received one of the medals, operates a private dairy at Bowmanville.

The CHAIRMAN: I see I am down on the programme for the purpose of reporting with reference to the Toronto Exhibition. I attended the Industrial Exhibition, and advised them to have a better place in which to exhibit our dairy products, and I think probably they will give us a better place in the future than they have done in the past. I hope and trust more dairymen will take advantage of this Exhibition next year. I understand the Windsor Salt Company are going to offer two one hundred dollar medals or two one hundred dollar purses in gold. I also understand that the Canadian Salt Association are going to offer two purses in gold of one hundred dollars each. That means over four hundred dollars in gold, and I think the butter and cheesemakers should take advantage of this.

Following is a report of the awards made in the Dairy Department:

Cheese, best two factory (colored), twenty-five entries: 1st prize—W. A. Bell, Dunkeld; 2nd M. Morrison Harriston; 3rd Frank Boyes, Nilestown; 4th R. Cuddey, Woodstock; 5th George A. Boyes, Evelyn; 6th Thos. J. H. Cornett, Shelburne.

Cheese, best two factory (white), twenty-eight entries: 1st prize—W. W. Harris, Brussels; 2nd B. J. Connolly, Kintore; 3rd M. Morrison, Harriston; 4th R. Cuddey, Woodstock; 5th J. S. Isard, Paisley; 6th W. A. Bell, Dunkeld.

Cheese, best three factory (colored,) fifty-four entries: 1st prize—W. B. Thomson, sweepstakes Nile; 2nd John Connolly, Malcolm; 3rd Wm. P. Stacey, Tecumseh; 4th F. B. Selles, Laurel; 5th, W. W. Harris, Brussels; 6th, J. F. Millar, Brantford.

Cheese, best three factory (white,) forty-eight entries: 1st prize—George Scott, Perth; 2nd, W. W. Harris, Brussels; 3rd W. J. Atkinson, Medina; 4th, Frank Boyes, Nilestown; 5th James McKellar, Armow; 6th Wm. A. McLaren, Avening.

Cheese, best six Stilton, two entries: 1st prize—A. R. Curzon, Guelph.

Cheese, best three, Truckle, nine entries: 1st prize—John Morrison, Newry; 2nd, F. E. Kline, Lakefield; 3rd, W. F. Gerow, Napanee; 4th, J. T. Hill, Napanee.

Butter, best two tubs or boxes, eleven entries: 1st prize—Struthers & McQuaker, Owen Sound; 2nd, Isaac Wenger, Ayton; 3rd J. Aaron Wenger, Fergus: 4th, Chesley Creamery Co., Chesley; 5th, Eden Creamery Association, Limited, Beaverton; 6th, L. A. Gott, Bothwell

Butter, best seventy-five pounds creamery, nine entries:—1st prize, Isaac Wenger, Ayton; 2nd, Aaron Wenger, Fergus: 3rd Chesley Creamery Co., Chesley; 4th Struthers & McQuaker, Owen Sound; 5th, J. M. Bird, Lafontaine; 6th, A. D. McPherson, Lancaster

Butter, best sixty lbs. Creamery Butter, eight entries:—1st prize, Chesley Creamery Co., Chesley; 2nd, Isaac Wenger, Ayton; 3rd, Eden Creamery Association, Limited, Beaverton; 4th, Aaron Wenger, Fergus: 5th, Struthers & McQuaker, Owen Sound.

Butter, best two tubs, sixteen entries:—1st prize, John Malcolm, Sheffield; 2nd, A. Elliott & Son, Galt; 3rd, M. F. Dolson, Alloa; 4th, George Clayton, Peepabun; 5th, Mrs. M. Burk, Bowmanville; 6th, J. R. Nickell, Rockwood.

Butter, best two firkins, fourteen entries:—1st prize, A. Elliott & Son, Galt; 2nd, Wm. Whitelaw, Meaford: 3rd, Mrs. M. Burk, Bowmanville; 4th, James A. Watson, Eden Mills; 5th, Samuel Hunter, Rockton; 6th, George Clayton, Peepabun.

Butter, best basket, twenty-one entries:—1st prize, M. F. Dolson, Alloa; 2nd, Mrs. George Wood, Bedford Park; 3rd, Mrs. M. Burk, Bowmanville; 4th, Maggie Bentham, Flesherton; 5th, Albert Orchard, Seagrave; 6th, J. R. Nickell, Rockwood.

Small butter packages, four entries:—1st prize, Creamery Package Mfg. Co., Chicago, Ill.; 2nd, H. M. Lick, Detroit, Mich.

HOW MILK IS SECRETED.

By Prof. H. H. Dean, Ontario Agricultural College, Guelph.

After a few words of pleasantry, the speaker proceeded to say: My talk this afternoon is a combination of theory and practice, namely, how milk is secreted by the cow, and what points should be observed in the milking of the cow. Now you will agree with me that the first part is largely theoretical, for the reason that we cannot look into the inside of the cow and see how the milk is secreted; we must speculate how in all probability she makes the milk. No building can be a successful building without a good foundation, and the best practical results are based on the best science. In order to milk cows successfully, and in order to make the most money out of our cows, we ought to know a little about the theory as to how the milk is made.

If there is any one thing which our Association needs to-day, it is to pay more attention to the man on the farm who is concerned in the production of milk. Our cheesemakers and buttermakers are up in their business. You give them first class milk, and they will turn out first class cheese. Give the buttermakers first class cream and as a rule they will make first class butter. But the trouble is in getting first class milk to our creameries and cheese factories, and more attention should be given to the man on the farm who is producing the milk. The drift of the discussion this afternoon has been along the line of the making That is trying to put the roof on the building before we get the foundation. More instruction should be given to the man who is caring for the cows and producing the milk on the farms. To return to my topic:

Milk is a secretion of the mammary glands Let us see if we can understand that. We all know that under certain conditions our mouths begin to water. Why do our mouths begin to water? Here in the cheek are situated glands known as the salivary glands. (Saliva is simply a refined expression for spit.) When you are real hungry and you smell meat frying or potatoes cooking, or pie in the oven, the fact of smelling that excites these glands and they begin to throw out or secrete saliva or spit; and the cows udder is built on the same principle as the glands situated in the cheek You must excite these glands in some way or other before they begin to produce milk or make milk. Now, there is a special condition under which these glands are excited to produce milk, and there are what we might call continual causes of excitement. For instance, when you first take hold of the cow's teat, there is a little milk in the cow's udder, but that act of touching the cow's teat stimulates or excites the glands to produce more milk, and you can never excite the cow to produce milk with a pitch-fork or a milking stool. Such treatment does not excite the glands but excites other parts. It is one of the essential things, in order to get the most milk from a cow, that this simple operation should be done in a manner pleasing to the cow, because the giving of milk is an act of affection, and some smart Yankee has put it, "If you want to get the most milk from a cow, you must, as it were, become her calf, and any man or woman who is not willing to become the calf of the cow, will never get the best results from that cow." That is a theoretical statement, and it is borne out by practical facts. You must become her calf, why? Because by so doing you stimulate these glands to produce milk.

The first milk the cow gives after parturition known as colostrum should never be used for cheese-making or butter-making, and very often cheesemakers have considerable trouble in the spring from the fact that people will send this colostrum to the factory, and it should not be done, because it is not true milk. Not until the eighth or ninth milking does this colostrum change into ordinary milk. This first milk has a very high percentage of albumen or sticky, yellowish matter which is of no value for cheesemaking. This albumen does not ripen, it simply rots and decomposes in the cheese, and a common cause of bad flavored cheese in the spring is this albumen, which is secreted by the cow the first four or five days. Every patron ought to have this fact impressed upon his mind.

The next point is, what light can we get upon the actual operation going on in the cow's udder, or bag, as most people say? There are two theories to explain how the milk is secreted. One theory is known as the transudation—which simply means oozing through. You see on this cheese before me that the butter fat is oozing through to the bandage, or to use the scientific phrase, it is transuding.

That theory is based on this statement, that the blood as it circulates from the heart is carried back to the udder, and the udder has the power of filtering out from the blood the material required for milk, or in other words milk is simply filtered blood. The main objection to that theory is that the blood and the milk are not of the same composition. If milk were simply a filtering from the blood, then milk and blood ought to be of similar composition.

The other theory is what is known as the metamorphic, that simply means a change of form. It assumes that the cow in the act of giving milk changes the cells of which the udder is composed. Dr. Connell, said this morning that the bacterium was composed of a single cell. A cow's udder is composed of thousands and thousands of cells, and the udder itself is made up of a number of cells, and the metamorphic theory says that the milk is simply a change of cells in the udder. That theory cannot be correct for this reason: The cow that won the first prize at the Provincial Fat Stock and Dairy Show gave 85 pounds of milk in a day, and I think it would be fair to assume that this cow's udder did not weigh more than twenty pounds. What does that mean? It means that a cow giving 85 pounds of milk a day would need to renew or build up the whole of that udder four times in the day, which is practically impossible. Therefore the metamorphic theory cannot be correct.

But so far as we know to-day, the probabilities are that the water, and possibly the other constituents in the milk, are largely filtered from the blood, and that the fat in the milk is a growth of the cells. The casein and some other parts are the result of cell activity. We can understand that best if we put before our minds a picture of the cow's udder. It is made up of bunches of grapes packed together. Now every bunch of grapes has a number of single grapes on it, and inside of each grape is the part which we eat, and then inside of that is the seed. Now the seed part we may represent as the cell and leading out from these grapes are little ducts or canals or openings. There are thousands of these in the cow's udder, and as these cells grow they change into the butter fat which rolls off into these little ducts, and by and by comes out into the teat as little particles of butter fat, which float off into the water or liquid part and travel down coming out at the lower end or opening of the teat. That explains why the last milk is richer than the first milk which we get from the cow. As these particles of butter fat grow in the cow's udder, they are held back by the sides of the cells or ducts, and do not get down to the opening so rapidly as the liquid part. So we will remember that in all probability part of the milk is made by being filtered by the blood. Part is made by growth of the cells which make up the cow's udder, and in these operations we have the theoretical explanation of how milk is secreted.

There is a theory which has come out recently known as the ferment theory. Some German scientists argue that milk is the result of a ferment in the cow's udder. There is a fact in this connection I would liks to emphasize, namely, that in every 100 pounds of milk there are about 87½ pounds of water. Where does that come from? Out of the food which the cow eats and out of the water she drinks, and unless that water and food is pure the milk will have more or less impurities in it. Why? Because such a large proportion of the milk is made up from the water, and the water comes from the food she eats or the water she drinks. Only pure food and water should be given to the dairy cow. We need to remember this fact also that the milk is largely made during the time of milking. A cow giving a large quantity of milk has been slaughtered and every drop of milk has been gathered up, and the largest amount ever found was about four quarts, hence milk is largely made during the time of milking, and the cow must be placed under favorable conditions at the time or you do not get the regular quantity of milk. Do not think that the milk is already there, and all you have to do is to draw it out. Only a small portion is in this state. Most of it is there ready to be changed into milk, but it is not milk, and we must have things favorable for the cow to make this change. We have demonstrated during the past season that the power to give milk does not cease with the death of the cow. We had occasion to slaughter a cow giving a large quantity of milk. We cut the udder off and then took one of the teats, and you could milk it just the same as you could if it was attached to the cow. I do not say you could get as much milk, but the power to get the milk from the cow did not cease with the death of the animal. The milk already formed there could be drawn after the udder was cut off completely from the cow. What do we learn from that? That the holding back of the milk already formed is not within the power of the cow. We hear people talk of the cow holding up her milk, she can only hold up a certain part of the milk. The small quantity formed there may be drawn, because the opening at the end of the teat is closed by a muscle, and when you press on the teat you cause that muscle to relax and the milk flows out; but the cow has the power to hold back any milk that is not formed. I have noticed that in connection with the milking machine most cows take kindly to it, but some do not. I have seen the rubber put on and the machine started to work and just a little milk came, and I have frequently gone up and scratched the cow gently on the hip or side, to take her attention from the machine, and the milk would begin to flow. So that you see the cow has control of certain parts of the milk. She has power to hold it back, and you cannot get it from her. We know that some cows will not give down their milk to some milkers.

There are one or two facts in connection with milk I would like to refer to, namely, as to the color of milk. I said at the Eastern Butter and Cheese Association at Lindsay that I hoped the time would come when we would never make a pound of colored cheese or colored butter. Some of the fellows thought I was crazy. I believe that by a proper selection of animals and by giving them the right kind of food that we can so improve the natural color of milk that it will not be necessary to add coloring, as I think the adding of coloring to the milk for cheesemaking is a dirty practice. There is at present a growing demand for white or uncolored cheese, and the time will come when we shall make little or no colored cheese and we will wonder why we were so foolish as to make colored cheese. Why do we make colored cheese and butter? The primary object of adding coloring to cheese and butter is to deceive the person who buys it. Now these people want to be deceived. You know Barnum said people liked to be humbugged, and we go on humbugging them with colored cheese or butter. Some people think that in buying highly colored cheese or butter they are getting something which is richer and better than what they are paying for—or, in other words, are getting a bargain. But I believe that we can improve in our selection of cows and the feeding of them so that we shall bring the natural color of milk and cream to that point where it will not be necessary to add coloring of any kind in order to satisfy average tastes. The yellow color of milk is due to a substance called lactochrome. Sometimes the food imparts this yellow coloring matter to the milk, and this question of coloring is one of the fine points in breeding and feeding dairy cattle to-day.

Now, as regards the odor of milk. Some people talk about a cowy odor. I hold that all milk when drawn from the cow has a natural or cowy odor. You may call it a cowy odor or anything you like, but there is a natural odor to milk. If we say we do not like this cowy odor we say we do not like milk, because all milk drawn from any cow has a certain natural odor. Sometimes milk has a turnipy odor, or a silage odor, or a stable odor. Whence come these odors? That is one of the questions which scientific men have not been able to thoroughly solve. If we knew how the turnipy odor gets through the cow and into the milk we might be able to stop it, but we do not. We made an experiment last year to see whether simply putting cows into a stable where a number of steers were being fed turnips would give a turnipy flavor to the milk, or the cream, or the butter, or in other words to test what is known as the "breathing" theory. Some say that the odor is breathed in by the cow and carried to the lungs, and thence to the milk. So far as our experiments went we were not able to detect any turnipy flavor in the milk of these cows where they were continually breathing this turnipy odor. I wish to speak of another fact, namely, the viscosity or stickiness of milk. This, no doubt, is the reason why milk is so hard to separate in the winter time, as there are many cows that have been milking five or six months. Their milk is viscous or sticky in quality or character, and the heating of the milk makes it less viscous and more fluid in character, and the particles of butter fat which are held in suspension are more easily separated when the milk is warmed.

We will come now to the practical part of milking. In the first place cows should be milked in a clean stable. That is an old story, I know. One of the boys on the train said he had been to a dairy convention every year for the last four or five years, and had heard these things so often he thought he knew everything that was going to be said. That is a characteristic of a young Canadian. They want something they never heard before. But I tell you we do not need new things so much as we need to put into practice the things we already know; and we can only get these things put into practice by repeating them, time after time, day after day, and year after year, until it becomes part of the nature of dairymen. No man can successfully put into practice anything which is not part of his nature. For instance, no man can be a successful feeder of cows unless he is wrapt up in cows, loves cows and takes an interest in them until they become part of himself. And no man can keep a clean cheese factory or creamery or milk cows in a cleanly manner, unless cleanliness becomes a part of his very nature. Men are naturally untidy, slovenly and dirty in their habits. Now, women are naturally cleanly and tidy, and if there is any man who is clean and tidy in his habits, I will guarantee that in ninety-nine cases out of an hundred he owes it to his mother and not to his father. We ought to have more women at these conventions, because they will preach cleanliness, practice it and enforce it upon the men. Every cow stable ought to be whitewashed at least once a year, and I doubt if you can produce clean milk or get clean milk where there are cobwebs all round, and straw and dirt on the ceilings that have not been swept down since the stable was built. There are enough men sitting round, holding down chairs in the kitchen, and getting in the way of the women, to keep all the cow stables in the Province of Ontario clean, and to have them whitewashed once a year. All the mangers and stalls should be whitewashed three or four times a year. That makes cow stables lighter, cleaner and healthier, as whitewash is one of the best disinfectants.

Then we ought to have a clean cow before we start to milk. There are a number of boys here from the Dairy School, and they remember a cow we got from a farmer last week, and when we put her alongside a clean cow the contrast was very great, and one could not help being struck with it. You may go into the stables in this country and you will find enough filth hanging to the cows to pretty well manure a small farm. Too much food is wasted by these animals in order to produce energy to carry the dirt around. If this dirt were taken off, they would use more of their food in the production of milk. That same amount of food if applied to the making of milk or putting the cows into condition, would be far more profitable.

When we put cows into a stable we take a pair of horse clippers and cut the hair from the hind quarters starting at the stifles and then going up around the sides of the cow to the pin bone. We then cut the long hair off the udder; then have some men take hold of the cow's tail, and take the clippers and run up the tail and cut all the hair off, and then when you have got that done take hold of the cow's tail above the bone, and take a pair of sheep shears or a jackknife and cut off the switch. That was given to the cow to keep flies off in summer time; but she has no use for it in the winter. She will knock it round your face sometime when it is covered with dirt. I doubt if you have enough Christian charity to take that quietly and say nothing. That is one of the first steps in getting clean milk, it does not cost very much, and it does not take very much time to do it. We ought to have a clean pail, and a clean person to do the milking. Every person should wash his hands before commencing to milk. A wash dish and a towel should be part of the furniture of every cow stable. Then the cow's udder and the under part and sides of the animal should be brushed off with a soft brush or damp cloth, to take off all the dust and bacteria which are going to drop down into the milk. Then you are ready to commence working—a clean man, a clean cow and a clean pail.

Some bacteriologists tell us that if we will throw away the first four or five streams that come from the cow you will never be troubled with gassy milk. They say these bacteria crawl through the little openings in the bottom of the teat and multiply very rapidly. The first few streams of milk wash these bacteria down into the milk pail, and they claim that if you will milk this on the ground and practice that day after day there will never be any gas in the milk. I doubt if you can get patrons to do that. If the average man or woman was to see these streams going on the ground they would think they were ruined—why, there is a whole tablespoonful of milk wasted !

We have made some experiments with milking the two teats furthest from you and then the two next instead of the two front and two hind ones as ordinary done. Our experiments have shown no advantage in glandular milking.

As to the number of times a cow should be milked, I am convinced of the fact that if you milk a cow three or four times a day you will get more milk and richer milk than if you only milk twice a day. That is why our sharp, shrewd dairymen practice milking three times a day at these dairy tests, but it is a question whether in ordinary farm practice it would pay. Why does it cause the cow to give more milk ? Because you excite these glands to a greater degree. You make a greater demand on the cow, and the best dairy cows respond to the demand as far as possible. Then the cow should be milked out quickly and milked clean. It is the nature of the cow to give milk rapidly, and any person who takes a long time to milk will never get as much milk as the one who milks fast. Milk the cow out clean, because if you do not take all the milk from her, she comes to the conclusion there is no use bothering to make more milk, because the milker does not want it, and by and by that cow will dry up. You want to make her believe that you are after every drop of milk, and if there is any sympathy between you and the cow you will get it.

So far as our experience goes in the use of milking machines they have not been successful. The milk becomes tainted and the expense of operating does not pay for the labor saved. I have found that the pipes in the Thistle machine through which the air is carried contains milk which is decomposed. The foul air in going through to the globe on the top of the pail becomes mixed with this milk thus tainting it. I am satisfied that a great many of the cases of tainted milk are caused by the impure air of the stable becoming mixed with the stream of milk as it travels from the teat to the pail, and we should e careful that the air in the stable is pure.

Any man who keeps cows to-day and does not know what each cow is doing is certainly not milking his cows properly, as a milk record is a necessary part of milking. There should be a record kept of each cow's milk—quality and quantity. I have noticed in looking back over our record that we have only one cow that we had when we went to the Dairy Department of the College in 1891. She has given 4,360 to 6,569 pounds of milk a year, and from 203 pounds of butter to 376 pounds per year since 1891. What does that teach ? It teaches that it is not safe to judge of the ability of the cow upon one year's record alone. There is a difference in the ability of the cows to produce milk and butter year after year, and also a difference in seasons. Another cow varied from 4,639 to 6,702 pounds of milk, and from 320 to 420 pounds of butter. Another varied from 7,994 to 10,090 pounds of milk. The milking is not completed until you have made a record of the quantity of the milk, and the milk should be tested as often as possible. We take samples from every milking and test with the Babcock tester weekly.

THE FARM WELL AND ITS CONTENTS.

By Frank T. Shutt, Chemist, Central Experimental Farm, Ottawa.

There has been of late a distinct advance in methods of farming. Our people have made an intelligent effort and improved their methods of farming, and the improvement has been towards more economical methods and results. The information that has been brought to bear upon this advance has been more particularly in putting into practical application those principles which underlie the farm, as regards the tillage of the soil, the requirements of plants and the necessities of animals.

A pure water supply is important, not only to ourselves, but is important to our farm animals, and to our dairy industry. I would not have you think for one moment that I am an alarmist I speak from what I know, and I say from considerable experience, extending over the past ten years, and from hundreds of analyses of well water made at our laboratory. I say this evil of polluted water is a very widespread one. It may be, that only those who very strongly suspect their water supply have sent samples to us to examine. We have been obliged to announce as suspicious over fifty per cent. of the samples that have been analysed. Over fifty per cent. of these samples are not fit to be used for drinking purposes, or for stock, or use in dairy products. There is no necessity whatever for that state of affairs. Our natural waters, the waters in our lakes and springs and streams are pure. We have to ask ourselves how it is that our natural waters are unpolluted, pure and wholesome, and how it is there are such a large number of our wells on our farms, and in our villages, in this filthy polluted condition? And then comes the second question: What is the nature of this contamination? and what are the causes of drinking water being so polluted?

I shall endeavor, very briefly, to answer these questions. I believe the cause of polluted water is the fact that we sink the well, merely with a view to convenience. Now, we will have to give that up. You know it is a common practice to sink a well in the barn yard, or near the barn, and it is only a matter of a very short time before that well acts as a cesspool. Then, wells are sunk near the back kitchen door, and the slops thrown out, and no provision made for carrying away that sloppy water. A chemical examination of this polluted water shows that, instead of being drinking water, it is only a species of liquid manure. I have at different times analysed and reported upon waters of which I could safely have said: "Use this upon your hot beds, because of the amount of fertilising material in the water." The nature of this pollution is drainage matter from the manure heap. That is the kind of pollution that we mostly have, and that is what we have to guard against. Then you ask me why it is dangerous? Well, I say in the first place, the water so charged acts as a direct poison upon the system. It may be a very slow poison. Prussic acid and strychnine do not take many minutes to do their work, but some poisons act very slowly, and that is the nature of the poisons that are contained in the water I have spoken of. I am convinced that the constant use of contaminated water lowers the constitution and the system, and that it is the cause of indigestion and diarrhœa and headache. If we would only look into this matter, we would find there is the cause of a great deal of the ill health on the farm. Once let the system run down and this polluted water will begin to act. There is another thing about the danger of polluted water. It is this: that that material in the water offers the most favorable conditions for the development of disease germs We have heard a great deal already with regard to bacteria, and we all understand now that diphtheria, typhoid and scarlet fever and a number of other diseases are the direct cause of the working within our system and our blood of certain germs. Now, I say that just as soon as these germs get access to polluted water, there they find all conditions for rapid development. That is how it is that typhoid breaks out in these rural districts. One person is taken down with it and the germs are carried from one part to the other, and it gets into the water supply, and that is often the case where it is a sandy soil. All the wells are connected just as if there was a tunnel. One well affected, all the wells affected, and then typhoid breeds.

One word for the animals. If the water is not fit for your consumption, it is not fit for the consumption of cattle, and more particularly for dairy cattle. I have often heard farmers say, "We do not drink the water any more; is there any harm in giving it to the cows?" I answer, "What is bad for us, must be bad for the cow." This water we drink forms the greater part of our blood. Milk is very largely made up of water that is drawn from the blood. Can you expect pure wholesome milk from a cow that is not in good health, and how is it possible to have health if you drink polluted water? The insidious effect of bad water upon animals often takes the form of lack of thrift. I have one case in mind at the present time in which a farmer told me his animals got plenty of good nourishing food, but they did not do well, and I said there must be something the matter with the water supply. I was perfectly astounded when I analyzed the water. It was not drinking water at all, and I strongly advised him to change the supply. That was only a year ago, and I since learned from him that he notices a material difference in the thrift of his stock. I have had occasion this last year to condemn the water used in some cheese factories. In one case the factory was situated on rocky ground, and they blasted a hole in the rock for a well. Some of the cheese was brought to me and it was considerably off flavor. They said they could not attribute it to any other cause except the water. They thought that by blasting the well out of the rock they kept out the other water, but the washing from the floor and other matter was finding its way out to this hole they blasted in the rock, and it was in a terrible condition, and the only thing they could do was to move the cheese factory and they did so.

In that case the quality of the cheese was seriously affected by the quality of the water being used at the factory, and if it is bad to use it at the factory it is just as bad to use it at the farm. I do not say that the cow using bad water will secrete in her milk typhoid germs; but I know that we have traced several times, that the washing out of dairy utensils with affected water has conveyed that disease to users of the milk. Water that is not fit to drink is not fit to use in washing out dairy utensils. You cannot clean a thing with impure water, that water is full of germs and disease, and it is highly improper to talk about washing dairy utensils with impure water.

In judging of the water for yourself, do not think because you have an apparently sparkling, tasteless water that you must necessarily have a good water. Waters which are fairly rankling in filth are sometimes of the whitest kind. Of course there are lots of waters so filthy that they are quite yellow and cloudy, and anyone pulling a cork out of a bottle filled with such water, and smelling it, would know at once that it was filthy. I say sometimes it is not necessary to analyze the water. A man's own intelligence would tell him it is not fit to drink. I have noticed that cows prefer polluted water. You know that we have inclinations, and we take things that are not good for us. Cows will drink that polluted water, even in preference to a good supply, but that does not make it any better for the cow. We should not allow our cows to drink from these stagnant pools. Do not rely on these tests that you see in the newspapers about putting a little sugar in the water, etc. I cannot give you any rough and ready way of making a water analysis. There is no positive way of knowing whether water is pure or impure except by chemical analysis; but as I told you before, there are cases in which it is not necessary to make an analysis, as the water is so bad that you can tell it at once.

With regard to the well. The water supply is one of the most important things on the farm. Every man should be prepared to invest a certain amount of capital to procure an ample supply of pure water. You must give up the idea of putting the well just where it will be convenient. It is more important that you should have your health than anything else, and it is just as important that your cattle should have pure water. If you will look into the last Experimental Farms report you will see a diagram of a farm yard, and it shows how the liquid manure finds its way to the well, and then you pump it up and drink it. The lighter the soil the further away you should put your well. I do not believe in putting a well under a building. You cannot look at it and have control of it. You should keep out surface water by having your well properly stoned up, and you should use cement or puddled clay to keep out the surface water. By making it wide at the top and sloping it down to the water level, you would prevent the water from the upper surface getting into it. Then do not throw garbage and slop around the well. It is a very bad habit to wash dairy utensil, etc., at the well. If you cannot do it in any other way, see to it that there is ample precautionary measures for taking away that wash water to a safe distance so that it is impossible for it to get into the well again. Do not use the well to cool milk in, because some day you will have an accident, and that milk will go down into the well and spoil the water.

Air-dried swamp muck is the best absorbent you can get. It will take up this liquid manure and make your surroundings clean and dry, and keep your well water in a good sanitary condition. If any farmer or dairyman suspects his water supply, he can, by writing to us, obtain a printed copy of directions that will be necessary to him to follow out in collecting and shipping a sample of water. There is no use sending me down a sample of water in a bottle that has held turpentine or camphor, or such things. I must have a certain quantity of water, and it must be in an absolutely clean vessel. This work is done gratuitously by the Dominion Government.

A MEMBER: Have you had any experience with drive-wells?

Mr. SHUTT: A drive-well may be no better than an ordinary dug-well. If you drive a a well so as to tap the water that comes from the layer below, then you will have a much purer supply than if you got it from the layer above. If you only make a drive-well through this uppermost layer you will practically have the same conditions that you have in a dug-well at that depth; but when you drive it down so as to take water which comes from the lower stratum, you have a chance of getting a supply that comes from the least polluted source.

A MEMBER: In the section I come from they are driving the wells deeper. The water is twelve or sixteen feet from the surface, and they are driving their wells some twelve or fifteen feet further down than is necessary, and they are getting splendid water.

A MEMBER: I understand watering cattle by a well is a bad practise. How far from the well should the water be pumped away?

Mr. SHUTT: The lighter the soil the further you put it away, and the further away the safer it is.

A MEMBER: In my locality we dug through a hard pan and we struck a bed of lake sand, which it is impossible to pump dry. That is below this hard pan. The soil is a heavy loam around the hard pan.

Mr. SHUTT: The water probably filters through that.

The MEMBER: We never have any trouble with the surface water in cellars. You might dig a hole ten feet deep and water never collects in it unless it falls directly into it. Supposing the barnyard is one hundred and fifty feet away from the well and the barnyard kept clean?

Mr. SHUTT: Such a well might be pure if you really mean what you say, keeping the barnyard clean. Of course the slope of the land is another thing we should take into consideration.

A MEMBER: Is it a good plan to keep the well high?

Mr. SHUTT: Yes; although you are not always sure, because the levels along which the water travels might slope downwards.

A MEMBER: I would like to ask your opinion of bringing water through a tile from a field—surface water; it looks sparkling and clear, and it is considered good water. Would the soil filter that water?

Mr. SHUTT: Once the soil gets clogged with filth so that the air cannot get to it, then that soil has lost it power of purifying.

A MEMBER: Do you think crops growing on the fields would contaminate the water?

Mr. SHUTT: No; they would purify rather than otherwise. The plants would use the nitrogen contained in this organic matter.

A MEMBER: Then you would consider that about the safest plan a person could adopt without having it tested?

Mr. SHUTT: As the water falls upon that field it is likely to be pure; but as that field is heavily manured the water will take it up, and that matter should not be in drinking water. If you have reason to suppose that water contains a large amount of material from well rooted manure, then I say that water is not the best kind of water to use.

A MEMBER: When manure is not applied, do you consider it pretty safe?

Mr. SHUTT: Yes.

SUMMER AND WINTER CREAMERIES.

By H. B. Gurler, DeKalb, Illinois, U.S.

From the title given this address there was a little question in my mind how I had better talk, whether you wished me to go into the actual details of making butter in the creamery, or whether you wished me to talk of some of the points of summer and winter work, and especially of the transition stage from summer to winter work.

Now, I wish to say what I can to help you. I am going to turn loose my mistakes, and I will say to you now my mistakes have cost me many times more than my luxuries have in my life. They are not pleasant things to talk about, but sometimes it is profitable to other people to have a person talk about them. I have been told since I arrived here that there were parts of your country here in which you are not in that transition stage, changing from summer to winter dairying ; and, as I have been through that several years ago, I can assure it was the most trying time of my experience in buttermaking—when I was doing a little of both and not much of either, and the patrons were not trained to the care of milk in the winter.

We will take summer work. In the spring and the fall when the temperature is favorable and the food nearly perfect, as with spring and summer pasturages, the temperatures of our creameries are pretty nearly as we want them, and there is very little to overcome in comparison to what there may be under other conditions. Of course there are times during the extra hot weather that we have considerable to contend with, for instance, there is the trouble to get milk properly cooled. It will be sour when it arrives at the creameries. A great deal depends on the man at the whey tank.

Now we will take the question of food, and water and atmosphere. With summer food we will have no trouble. I have had trouble from bad flavored milk, from weeds in the pasture, like mayweed and ragweed ; I have had trouble from cows drinking bad water, and from impure atmosphere—for the milk will absorb impurities from the air. We must not trust too much to the judgment of the person who is going to care for the milk. Many times the patrons are sufficiently intelligent, but do not use their judgment, and we must not trust too much to them. I will tell you one little incident that came to a friend of mine, a veteran dairyman, Dr. Teff, who was for many years President of the Illinois Dairy Association. He told me that they had trouble at the creamery, which caused them a great loss, and continued for several days at a time. That trouble was traced to a dead animal in the cow pasture. The animal had died, and had been allowed to lie there in the bad part of the pasture to go to decay, and the milk from that dairy was introduced to the creamery and created a great loss. I have had men tell me that they do not believe that result would follow, but in this case we know it did, for as soon as the cow was removed the trouble ceased. I speak of this to show the need of care.

There was a noted dairyman in the west, who once said he could make a buttermaker in a week. I will admit that, if you take a man who has years of training that will pave the way for that buttermaker and have everything perfect ; but the idea that you could go to work and make a butter man in a week who can take care of himself is a great big mistake. I do not think that there was ever a buttermaker made in a week that could stand alone under difficult conditions. There is more dependent on the man in the creamery who handles the milk and makes the butter than most of us suppose. We must get a trained man who can steer clear of mistakes, and make good butter from one end of the year to the other. I have worked at a dairy for years myself, and I have had a great many in my employ. I find some men that I never had any trouble with ; their goods are always right. If there is any difficulty they get onto it in time to prevent a loss, and there are other men who do not know what is wrong. If you do not find it out yourself before the butter leaves, you will get it back from the other end of the line. There is more skill required in winter than in summer. That is my experience. There is more to look after, especially in this transition stage. I find we have got to look after the food. Frequently I have to taste a sample of each patron's milk at the creamery to find out what is wrong. I take a sample of the milk and warm it up to 130°. I remember, in one case, we traced it to one single cow, and that single cow's milk created a bitter taste in all the cream that came to the factory. I located the dairy and then had a sample of each cow's milk, and by this means located the cow, and the cow was apparently as healthy a cow as there was in the herd. The trouble ceased as soon as that cow's milk was excluded. I have had trouble that I traced to decayed ensilage, lack of good care in keeping the silage properly trimmed up, or having so much surface exposed that you cannot feed it fast enough to keep ahead of decay. I think there has been more trouble in silage from that than from anything else. I have traced trouble at the creamery through mouldy ground food. I have found this put in one corner of the cow stable, and the moisture of the cow had condensed in that room, dropped back, run down the walls, moistened the food and made it mouldy; and the cows were getting enough of that to give a bad flavor to the milk. Now I recognize the fact that I am not at home, I am talking to Canadians. What might suit in Illinois might not suit here. We find with us that the winter dairying work and winter creamery work equalize the labor on the farm, and enables us to keep a uniform amount of help summer and winter. In this way we secure better help by giving constant employment. A short time ago I was talking with a gentleman at Elgin. He had a sample of butter that came into one of his creameries. He wanted me to give my judgment of the butter and it lead on to his giving a little experience. A short time before he had found something wrong with his butter before it got away from his creamery. He located the trouble in the shredded corn fodder they were feeding to the cattle. They cut sufficient to keep a week, and there was must enough in it to cause it to mould, and that mouldy corn fodder caused him to have a bad flavored butter. He told me of the case of a large factory in Illinois where they made a large loss of a great many thousand dollars that they traced to the same cause, and the loss occurred before they were able to locate where it was.

Now, we hear a great deal of talk about the silo and the danger from it. I am not going to say there is no danger from silos, but I actually think that right at the present time, in my locality, there is more danger from tainted corn fodder than there is from silage. I would not say there was as large a percentage of trouble from the corn fodder as from silage. If the silage is looked after properly, there would be no trouble.

Last week I was called upon to score dairy butter at the Institute of Illinois, and after I got through with the score one of the dairymen came around to me and showed me his score. He had 43 per cent. on flavor and he was tickled clear through, for he said, "My cows had nothing for coarse fodder except corn silage." He had the highest score of anybody in the exhibit, and it was the nicest exhibit, I think, I ever ran across. There were several who had as high a total as 97½.

Several years ago I had trouble with my butter that I traced to the effect of the calves being tied in the barn floor in front of the cows. I had serious loss at that time. The butter did not show anything particularly just at the time, but it commenced to go to pieces by the time the butter was ten days old. Now, I do not know whether these cows took that through the system or whether the milk absorbed it. It does not matter which, as far as the results are concerned. I had serious trouble, and as soon as the calves were moved from the proximity of the cows we had no trouble. I know the buttermaker in his winter work will have these things to run against. I remember once finding the hog-pen odor in the milk. I followed that up and found the man was taking his night's milk and putting it in an open vat, and putting in an open room where there was nothing else, and he was leaving the windows up to get a free circulation. The hog-pen was about fifty-feet away, and the odor from that hog-pen went into that room through the open window when the wind was in the right direction. The milk absorbed it and we were able to detect it in the milk. I knew one gentleman in Vermont who had skunks around his place. He was making butter and shipping it to Boston, and the dealer there was able to tell him what was the matter with his butter. He found the odor of skunk in that butter after they took it to Boston.

About a year ago a prominent creamery man in my section was talking to me, and the question was raised about the cowy odor of milk. I said, "You know what it is, don't you?" and he said, "No." And I said, "It is filth." There are so many that do not appreciate cleanliness in caring for the milk on the farm before it reaches the creamery.

I want to give you my experience in this transition stage from summer to winter work. I had the contract with a firm in Philadelphia for creamery butter; they were to take it at Elgin price right along for several months. The contract was made in the month of September; the goods gave satisfaction up till November and December. At that time there were not sufficient cows; they were all strippers, and the butter began to give out in flavor. It reached that condition, as far as flavor is considered, till I lost the trade. They even suspected that we were adulterating the butter; it had that kind of tallow flavor, and you will find that with strippers' milk.

When you get over the line far enough to get half your winter milk from fresh cows you will have none of that trouble. Another case of serious loss was that of salt. The salt was kept in a room outside the creamery, built for the purpose of keeping salt, and right alongside the open shed where we tied our horses when we went into the creamery. We found that the salt had absorbed the ammonia from the horse shed, carried it into the butter, the butter carried it to New York, and made us a great big loss.

I have had two experiences of that kind. The first one was discovered before it created any loss, and that was when the salt was allowed to stand in the shed in close contact with some barbed wire that was painted. It absorbed the flavor of carbolic acid from that barbed wire, and got it to such a degree that we had to use it for stock.

When I first commenced to feed silage, I had some butter made from silage milk, and some other butter made from dry feeding milk at the same time, and the packages made so that we could tell them but nobody else could tell which was which. And we had the experts in New York test that butter, and the silage showed up just as good as the other butter. I am running my farm now for the production of milk for the Chicago market for infants. When I started that trade I did not feed any silage, for the first winter, to the cows, but I followed up the milk from the stable that was fed silage, and that which went to the creamery work. From the stable that was fed dry feed entirely, the cream went for this new line of work. I had samples of this milk brought to my residence in town, marked so that I knew which was which, and the rest of the family knew nothing about it. We had that warmed up to a temperature at which they could give off any flavor that was there, and we followed that for about three months almost daily before I became convinced that it was entirely safe to feed silage for that grade of milk—my certified grade of milk. I might say that my wife and daughters in the majority of cases would select the milk from silage as the sweetest and nicest milk of the two.

Now we come down to the care of milk by the patrons on the farm. Our rule is that the milk should be cooled and aerated to a point close to 60° and not above 62°. I will give a few minutes' time to the question of butter making. We do not, of course, take milk that is not right. I find that we can skim a little closer by warming the milk in a body; it separates easier. The fat in the milk does not expand so quickly as the other parts of the milk, and the difference in gravity is more intense if it is a little time heating.

After separating, I think it advisable to cool that cream down below 55°. Running it over a cooler like the Star or the Danish cooler, and cool it down below 55° immediately from the separator. Then it goes into the vat and stands until the work is through, and should be frequently agitated to get rid of the froth that is on top of the vat.

The temperature of ripening depends upon how soon you are going to churn. In winter time we will need to set that cream to 68° or 70° to have it right for churning the following morning. Some use starter and others do not. If you have strippers' milk I would make a starter from a fresh dairy—from a dairy where the cows are fresh and the people cleanly—and make that starter ever day for the following day's use. I am afraid of carrying this starter over, for, if we get a little bit off the track, it keeps growing on us, and we get considerably off before we know it. When it comes to churning, I think it advisable to churn at as low a temperature as possible; the temperature depends on the richness of the cream. You take cream that has 15 per cent. of fat in it, and you probably will not require to get that at a lower temperature than 60°. Take a cream that is 30 per cent., you can get it to go at a temperature of 50° or 52°. Where your cream is in condition that you can churn it at 50°, you will find there is very little more fat in your butter milk than there is in your skim milk.

When it comes to washing, the amount of washing depends on the temperature. If your butter has come at 60° or 65° it will need more washing than if it came at 50° to 55°. If you can get your butter together at 50° you are safe not to wash it at all, and you get a high flavor by not washing it. The temperature of the wash water should be right close about what the temperature of the butter was. That is, if you have your butter at 56° to 60° have your wash water at that temperature, so that it does not change the condition of the butter before salting. In salting use the amount of salt that suits your trade. We practice a single working of butter. I prefer twice working the butter. You can always tell in the second working when you have got it worked sufficiently. The question of packing depends on the trade. Our trade has been drifting to prints.

A Member: Suppose I have ten gallons of cream by deep setting cans. I have got the cream sweet, and want to make it into butter prints. I have a revolving churn and butter worker and have the salt all ready. What is the best process to get that cream into butter?

Mr. Gurler: Your cream is supposed to be all right. It is not ripened. Cream from a deep cool setting is a little more aged than from a separator. I should put that cream at a temperature of 68° to 70° for twenty-four hours before I wanted to churn it, and that will bring about the right acidity at churning time. But you must not let this cream be exposed to the atmosphere about the house. The recepticle that you have your cream in must be kept covered. If you have trouble in controlling the atmosphere, have a half barrel that you can fill with water, set your cream can right in that water, and hold it at the proper temperature. And when you come to churning, it is advisable that the cream should be cooled. After it is ripened you can put your cream into some small can or vat, and cool it down before it goes into the churn. It is quite essential that cream should be cooled down to a low temperature before churning. It affects the flavor of the butter, and loss of fat in the butter-milk.

A Member: Supposing I churn it at the right temperature, when I churn it, and have drawn off the butter-milk, is it advisable to put the salt in the churn and revolve the churn with salt in it?

Mr. Gurler: The only objection I ever had to salting in the churn, is to know how much butter you had there. The prettiest place in the world to salt butter is in the churn, if you can salt it before it begins to pack, when it is in the granulated form.

A Member: What is the best method of determining the state of acidity before churning?

Mr. Gurler: There is an acid taste that you can tell by tasting which you can get by a little practice. You want that lactic acid.

Mr. Thomas Barry: If you salt in the churn you cannot tell how much butter you are salting.

Mr. Thomas: We salt in the churn first, and the second salting we do on the worker. If we find we lack a little, we add a little till we get the exact amount required.

Mr. Gurler: I would not say but you could get good results out of that, but I would hardly recommend it to every dairyman.

Mr. GRAY: You said you run the milk over a pan to cool it.

Mr. GURLER: It is a cooler with the water running inside and the cream running outside. We usually separate at 80° for our butter, and for cream we separate at the temperature we get it in. In this cooler we use well water. We get the water at a temperature of about 50° to 52° and, with the Star cooler we can get the milk down to the temperature of the water we cool it with, or within two degrees of it. We separate at 80° and churn at from 50° to 55°.

A MEMBER: What is the cause of the mottled appearance in the butter?

Mr. GURLER: The cause with me is the salting of it. It comes from the butter not being properly worked, or it may come from the butter not being of a uniform temperature.

A MEMBER: Do you not think 52° too cool to work butter at?

Mr. GURLER: I have had no trouble of that kind at all, where you take it right out of the churn and it is of a uniform temperature.

A MEMBER: It would depend on the temperature of the room I suppose?

Mr. GURLER: It is only a short process. It should not take five minutes before the work is done.

A MEMBER: Have you had any experience with Prof. Farrington's tablets to ascertain the degree of ripeness of cream?

Mr. GURLER: They are all right.

A MEMBER: What preparation do you give your tubs before you put your butter into them?

Mr. GURLER: We have never done any export business. We soak the tubs thoroughly in hot water, then they must be cooled, and when they are emptied it is advisable to rub salt on the inside of the tub, just leaving moisture enough in the tub so that the salt will stick to it a little.

A MEMBER: Do you line them with paper?

Mr. GURLER: We do where it is requested.

A MEMBER: Do you wax the tubs inside?

Mr. GURLER: No, we never have. We have little eight or ten pound pails that we have used paraffine in. We have had no trouble with the paraffine.

A MEMBER: When you churn at a temperature of 50° or 52° do you wash with the water at the same temperature?

Mr. GURLER: Yes, just as near as we can get it. We take water right from the well and that is 50° or 52° the whole year round.

A MEMBER: What kind of worker do you use?

Mr. GURLER: A platform worker. If you take butter out of the churn at 60° and let it cool till the outside is colder than the centre, then you are going to have some trouble.

A MEMBER: You take the butter from the churn as you put it on the worker?

Mr. GURLER: Yes, that is our practice.

Mr. BELL: I would like to know the chief cause of this waxy texture in the creamery butter, something that the customers all want next to flavor.

Mr. GURLER: That is a difficult question to answer. You will find more of it when you work at a low temperature than you will at a high temperature. A couple of months ago, a gentleman in Chicago took me to show me some process butter. To make this stuff, they buy up all the butter and deodorize it, then churn it with some milk, get a nice odor into it, and sell it as Elgin creamery butter. The first lot I was shown was all right, but put it to the mouth and it was mealy; that waxiness was all gone. I am confident that a low temperature in churning helps to give us that waxy texture in the butter.

Mr. Bell: How long should cream be cooled down to the churning temperature before churning?

Mr. Gurler: Two hours.

Mr. Bell: Would not a longer time be better?

Mr. Gurler: Yes, but I put that as the minimum time.

Mr. Bell: The cream is allowed to stand at 68° or 70°, and, when it becomes thickened up or ripened, they start cooling it which takes some little time. That is done at night, and it remains at a churning temperature all night. Is that right?

Mr. Gurler: I would not recommend it. You can cool it down the night before, and it expedites work. Many times that is the inducement, and we neglect some little points to save something in time. We are quite apt to do that always.

A Member: What amount of starter do you use?

Mr. Gurler: From two to five per cent.; I am not very particular about that.

A Member: Is that for twenty-four hours or forty-eight hours?

Mr. Gurler: Where forty-eight hours are practised we would hardly use any starter, as the cream would ripen itself in that time. I would not advise holding forty-eight hours where you use a starter.

COLD STORAGE.

By Prof. Robertson, Dominion Dairy Commissioner, Ottawa.

After talking in similar terms to those used at the Lindsay meeting (see page 47) the speaker proceeded to say: The British market is a very large market—a market of six hundred million dollars for twelve things that we in Canada can produce better than anybody else in the world. The twelve big things they buy outside for food—like wheat, flour and grain, and live animals, dressed meats, like bacon and beef, and then cheese and butter and lard and poultry and eggs and fruits—these things are bought by Britain to the extent of $600,000,000, and we of Canada send now only about $40,000,000. We do not fill that market as we might, considering our acreage and population. That is a good market, also, because it is the only market for the surplus of farm products.

Canadians should feel proud that they are part of the British Empire. They are part of no mean empire. Once when a man said, "I am a Roman citizen," he found he was a man whose citizenship gave him a standing in any part of the world; but he did not have so much to be proud of as a man who can say, "I am a British subject." (Applause.) Even our wealthy people to the south could not get on for one year and pay their debts if it was not that they are catering for our people in Britain—waiting on the British people. To be a British citizen is the best citizenship possible for any man on this globe.

There are some difficulties in reaching a distant market. You first have to think of the cost of carrying the goods. The cost of carrying these things from Ontario to Britain is less than one cent per pound, and I think that is a very fair price, considering the distance. But sometimes butter and cheese have been spoiled. While the price for carriage was low it was not safe carriage, and that is an essential thing to them. And a big question for farmers is "improved transportation from the fields to the foreign market;" for a dollar saved is so much more to the farmer.

Cold storage is, first, to prevent things from spoiling; second, to extend the marketing period. Strawberries, saleable for four days only after they are picked, could be kept for four weeks in cold storage. Butter, saleable in its best condition for less than a fortnight, could be made saleable for four months by the use of cold storage. Then it gives a man a better chance in the choosing the time when he will sell. He is not bound to sell immediately the thing is ready. I do not intend reading you the bulletin on the cold storage, I will simply say, the chief commercial use for cold storage is to protect the products from being injured on their way to market in order that they may get there in the best of condition.

We must remember that the storage is a building, and that building can be made cool only if it is well constructed. First of all, in constructing a room for cold storage, an effort must be make to insulate the inside room from the atmosphere. An insulating substance is one that will separate a substance of any one thing from another. An insulating substance is a good one if it will keep the heat from passing through it. The very best insulating substance is ordinary atmosphere—ordinary air. There is nothing we know of that will carry heat more readily than air if it is in motion, but if you hold it still, heat will hardly ever go through it, and the main thing to consider in constructing a cold storage is to have the walls so constructed that you can hold a quantity of still air in the walls. You use the lumber for what purpose? To hold the building together, to hold the paper in place that the paper may hold the air in place, and the main thing is to hold the air in place. If you have a hole in the top and bottom of the wall you have a place where the air will pass through. If you have it stopped up at the top and the bottom, it will hold the air there, and that is the proper thing to do.

Take an ordinary cold storage room, built with ordinary walls, and have it cooled with ice and it will take seven-eighths of the ice that you have there to keep cool the air that comes through the wall and only one eighth will be of use to cool what is in the storage. You see how important it is to have the construction as thorough as possible to prevent the heat from getting through. As a cooling agent, I say ice is as good as ammonia. A good many people think that an ice-house is a damp place. All over the cold storage rooms we had in creameries last summer, you could go and strike a match at any time on any wall, and the thermometer was 34°. The ice condenses the moisture of the air and makes that air thoroughly dry.

A cooling agent is to cool the chamber, and then, it is to cool whatever goods you put in there. It has also to take up the heat that comes through the walls, and that is a great deal; and then it has to cool the air that may rush through the door, and that is a great deal. A cold storage should always have an ante-room, so that you would never have the two doors open at the same time; and then the fifth use, is to take up any heat that is generated. In an ordinary curing-room for cheese, each cheese becomes a slow furnace for generating heat. When a cheese is being cured, it will generate so much heat that if you close the curing-room up close, you raise the temperature from five to seven degrees warmer than the temperature outside; the same as putting turnips inside a root-house that is closed up.

Let me show you what a cooling power ice has. Ice has far more cooling power than cold water. It is equal to 142 units of latent heat in water. If you take a pound of ice, which is, at freezing point, at a temperature of 32° or 31°, and a pound of water at 142° of temperature, and put these together, the two pounds will just be, when the ice is melted, at freezing point and no higher; but if you take a pound of water at 32° and a pound of water at 142°, and mix these two pounds together, there will just be an average of the two pounds, or 87°; that shows the cooling power of ice over water at the same temperature.

There are a few important points to remember in storing ice for any purpose. The first one is, to protect the ice from any current of air touching its sides or bottom. Anything that will let a current of air come against it, will melt it. You must have an insulation of sawdust or cut straw. I find one and a half feet of cut straw will keep the ice as well as a foot of sawdust, and I think it is better because, if you get too much sawdust, it will heat itself and melt the ice. For the top of ice I like long straw. It will keep the ice better than anything else I have tried. When you push out the ice, you push the long straw with it; but if you do the same with sawdust, some of the sawdust comes down and melts it. The next thing is, to have the ice-house so constructed that there is drainage below the ice, and the third thing is to have it closely packed so that there is no space between the blocks of ice. Pack in layers, and then smash ice into the space between so that each layer is thoroughly closed down before the next layer is put on. The fourth is to have thorough ventilation over the top of the ice. If you construct the ice-house and cover the ice with straw two feet thick, and close the building in tight, the straw will heat and melt the ice. You must have thorough ventilation over the top of that straw. I have a number of bulletins on this subject and will be very glad to send copies to people who want them. I will send to any dairyman, who wants them, a full set of blue prints, so that any carpenter can take the drawing and build an ice-house or cold storage building at the creamery or cheese factory. You can get these by sending to the Department of Agriculture, Ottawa, for them, and it will pay you to do so, if you intend building anything of that kind.

A Member: Could a building like that be used for warm storage in winter time?

Prof. Robertson: Anything that will keep the heat out will also keep the cold out. To provide cold storage at creameries the Government has arranged to give $100 to every creamery owner who will put cold storage room at his creamery, and a cold storage room could be put up for about $160. The bonus is now available for 1898 and two following years for those who will do this work. It is payable in instalments. To show you how there has been a great increase in the butter trade since the cold storage has come in, the export of butter from Canada in 1894 was just 32,000 packages, the next year, 67,000 packages, the next year, 157,000 packages, and the last year, 227,000. Seven times as much butter was shipped from Montreal 1897 as in 1894. I think it possible to keep on doubling that for many years to come, if the butter is sent in very fine condition.

In cheese factories there is need for improvement in the condition of the curing rooms, and in storing conditions for keeping the cheese, not cold, but cool. The cheese curing-room should be so constructed that the cheesemaker could regulate the temperature. I do not know any reason why the maker should want to have the temperature of the milk at 98° or 78° except for one thing, so that he can regulate the expulsion of the water and the amount of fermentation that goes on, and these are two things that should be regulated in the curing-room, and they are just as necessary in the curing as they are in the milk vat or in the cheese press. This is done now by closing the windows and trying to shut the air in. It is rather an imperfect method. Something is done by opening the windows at night, leaving them open all night, and closing them in the morning. The dark condition of the curing-room is not a good condition for making fine flavored cheese. A very good plan to get the room cool is to sprinkle it with water in the morning. That will make it three degrees lower in temperature. I will tell you how they cool rooms in hot climates. They hang cotton or sheets in the windows, and have one end of it in water like a wick, and the evaporation of that will cool the atmosphere of the room five, six or seven degrees. The next thing is to use air drains. These are not new, but are not in common use. I have had air drains in use in our curing rooms in Prince Edward Island since 1892, and have had the utmost satisfaction since using it. By having your drain 50 ft. long by 4 ft. deep you get a current of cool air coming into them that will bring the temperature down seven to nine degrees. Have a good strong wire net to keep the vermin from getting up into the curing-room. I think that for at least five times in the last five years I have made a special effort to get that information before the cheesemakers, and only last week I found, in a paper published in Montreal in French, a drawing of this air drain for the cooling-room, taken from a paper in Ohio, and the paper in Ohio had the drawings and information given Governor Hoard when he was here three years ago, and that was got from cheese factories in Prince Edward. That is the meaning of these cheese conventions, and every cheesemaker should read these reports. Every cheese factory should have an ice house so as to temper the atmosphere in hot weather. If we do not do these things we will hardly get through safely, because we will lose in the weight of the cheese and in the quality of the cheese. I mentioned yesterday that in England last year I examined the best Canadian cheese in the warehouse, as against the best British, and I found the best Canadian cheese selling at 42 shillings, and the best Scotch and best English selling at 60 shillings, and the difference was that one had been slightly heated and the other kept cool all the time. Now we do not get our cheese into the class of customers who buy this cheese till the cool September cheese is made. As soon as we get our summer cheese fit for this class of customers we will get a better demand and better prices. The system of cold storage provides cold storage at the starting point, and cold storage on the railway. I think cheese might be carried on ventilated cars, but butter should be carried in refrigerator cars. On every leading line in Canada the cold storage car runs once a week, and anybody can use that at the ordinary rates. Some of the cars pay their own way, while others still cause a deficit. I would like all the creamery men to look out and ship in refrigerator cars. You make take two tubs or half a car-load. There is accommodation for shippers, and no extra charges made for icing. There is cold storage on the steamships, and butter has the first preference. I think there will be improved storage on ships for cheese this summer, and also for apples. I have gone many times to Britain, but only twice in the summer time. I would not have any knowledge that would be accurate on the condition of Canadian cheese landed in August in England. People say the ships carry them all right, but you would not believe the difference in the flavor and odor of this slightly heated cheese in Liverpool and the way they leave Montreal. Apples do not require cold storage, they want cool ventilated storage. Last year a lot of apples from western Ontario were shipped together; nearly 600 barrels of early apples; 267 barrels were sent in cold storage, and they were sold for 18 shillings a barrel; they sent 370 barrels without cold storage and they sold for 8 shillings a barrel. In one case the apples all landed in good condition, in the other sixty-three per cent. were reported badly packed or wet. The use of cold storage simply means that we can land our goods in just as good condition as when they leave this country. If those who are here will take up this question of cold storage they will get a great benefit for themselves.

THE THEORY AND PRACTICE OF BUTTER-MAKING.

Mr. John A. Ruddick read a paper on the above-named subject, which appears in the report of the proceedings of the Eastern Association. (See page 38.) He added:

Since this was written we have set up a pasteurizing plant in our dairy school, and I can say, from our experience of about four weeks, that I am highly delighted with the results, and our customers who are in a position to judge—we having sent some of the butter to an exporter in Montreal—say that it has made a marked improvement in the quality of the butter. We are getting good markets, and we are in a position to compel our patrons to send good milk. We can say to a man, and I have said to men: "Your milk is very dirty, and I am sorry to say that, if you do not brink your milk cleaner you will have to take it home, and it will stay there." There is no other place for the milk to go, and they come to us almost pleading. I talked like this to a man the other day and he said: "I have done everything I possibly could—I discharged one of my men whom I thought was dirty." The cheese and buttermakers are a great deal to blame when they are not so situated. If one man at one factory sends back the milk, there are so many of the neighboring makers willing to take it, and to tell the patron "that is fine milk." If every maker would refuse to take milk refused by another maker, then we could stand right up and demand a better quality of milk.

The question of pasteurizing is, I think, one that demands careful attention on the part of buttermakers in Canada. I feel convinced that it is something that will result in a great benefit, especially in winter butter-making. I commend it to the consideration of every man who is operating a winter creamery. It is somewhat difficult to heat the cream to 158° and avoid heating it to a higher degree. Some scientists place it just at 158°. They say if you go higher than that you develop that cooked or boiled flavor.

A Member: Would a little less temperature do?

Mr. Ruddick: It would, provided that you hold that lower temperature longer. The lower the temperature the longer you must hold it. Even at 140°, if you hold it there a half an hour, it would have the same effect as heating to 158° and holding it there for five minutes.

A Member: Would it do to heat the milk?

Mr. Ruddick: It would do, and some practice that method. The idea is all right, and I believe in most cases the milk would be separated somewhat better; but unless you are prepared to cool that milk right down below 50° you had better not do it. Unless it happens that the skimmed milk is delivered right into the cans, taken out into the sleighs, and cooled in that way, there is danger of it spoiling. It spoils so readily at a high temperature. It is a pretty big contract to cool down the skimmed milk. We heat it to 158°. That is done almost instantly, and then the machine elevates it about six feet over the cooler which cools the cream by just passing over it; from 158° down as low as 48°, and that instant cooling from the high to the low temperature, Dr. Connell tells us, is of great importance and helps as much as anything to improve the cream by destroying the bacteria.

A Member: If there is the least sourness in that cream would it do to pasteurize it?

Mr. Ruddick: There is a certain amount of acidity develops in cream, and when they heat it to a certain temperature it will thicken, and you cannot pasteurize it if it is in that state. We have had marked improvement in the flavor by pasteurizing. It has rather a milder flavor than unpasteurized cream, and the butter is more of a waxy consistency. I think this is more due to the cooling than the heating.

Mr. R. A. Thomas: I have found fairly good results from salting butter in the following manner: As the butter lies in the churn in granular form I sift half the salt evenly over it, then, giving the churn a quarter turn, thus turning the butter completely over, I then sift on the other side half of the salt, then revolve the churn five or six times, then remove the butter into boxes made for the purpose. As it is uncertain what weight of butter is in the churn, I estimate it as nearly as possible and salt it one-eighth less than I wish it to be when finished. The churning is then set aside in a suitable room for three or four hours, when it is weighed and put on the worker. Sometimes I find the amount of salt already in is just the amount required. If not I then add one eighth, more or less, to make up the proper amount. Allowing the butter to stand in this way the salt dissolves, and is fairly well distributed through the butter. I find on working then sufficient. I would like Mr. Gurler to say if he would disapprove of th s method.

Mr. Gurler: I do not see any particular objection to your plan, only that you depend a good deal for your guidance on yourself when you take the butter out of the churn.

Mr. R. A. Thomas: It occurs to me then that, if the butter was weighed immediately it was taken out of the churn the amount of salt deficient could be added at once. By sifting it over the top of the butter now in the boxes (as the butter is still in the granular form) and stirring it in as well as possible, this added portion of salt would then dissolve and pass down through the butter. Do you think this would be a good plan?

Mr. Gurler: I do not see any objection to it. I feel that this is a matter that requires a good deal of judgment, and it might not be a safe plan to adopt. It is altogether a matter of judgment when it comes to salting in the churn. In our practice we find that we have to make a few trials to get the proper amount of salt to use when we salt in the churn. If you put a certain amount of salt into the churn and there is a large amount of water in it, a brine will be formed and you will not get it properly salted.

Mr. R. A. Thomas: You find fifty-seven pounds is required to make fifty-six pounds in the old country.

Mr. Ruddick: Yes, it will shrink, and I would rather give that right at the start than to have to allow for shrinkage when you put fifty-six pounds in. If you put in fifty-seven pounds you can then stand up and demand full weight.

Mr. Derbyshire: It will shrink in a week.

Mr. McFarlane: Do you know what makes butter get white streaks?

Mr. Ruddick: There are two or three different things that go under the name of white streaks. There is no doubt that the mottled appearance of butter known as white streaks is largely due to the unequal distribution of salt. White streaks are due largely, in my mind, to the fact that the butter has been worked too hard, and the surface has been rubbed and given that lardy appearance, and when the butter is packed together the white streaks appear. White streaks are caused too by curd particles in the cream which have been left in the butter.

Mr. Hunter: We have a private dairy in which 50 or 60 cows are handled, and our butter is put on the local market. We want to try pasteurizing our cream. There is no steam power on the place. Could you not help us, in some simple cheap way, to pasteurize our in the absence of steam power? Do you think that boiling water, with the cream in the can inside of a larger can, would be the means of getting the temperature high enough?

Mr. Ruddick: Yes, there is no doubt you can. Use a can of small dimensions. Perhaps one of the ordinary shot-gun cans is about as convenient and as good as you can use. Have something in that can to thoroughly agitate the cream all the time. I would not heat it more than 150 degrees at the out-set. Let it stand for 15 minutes and cool again as quickly as possible after that. I prefer to cool it down as low as you can get it, below 50 degrees, and allow it to stand at that temperature before warming it up.

Mr. Barr: Will you describe that thin box you mentioned in your paper?

Mr. Ruddick: That package would only be suitable for winter use—cold weather; it is just a thin box.

Mr. Barr: In the case of separator creameries, do the patrons deliver their own milk at the skimming station? If the conditions were such that the manufacturer would have to pay 10 or 15 cents per hundred pounds to deliver the milk to the skimming station would it pay? Is it customary to take the cream to the creamery?

Mr. Gurler: My practice, and nearly all in my vicinity practice the same, is: The majority of the patrons bring their own milk, or they make up a route and the hauler will get ten cents per hundred pounds, and in some cases where the roads are good, and he can make up a large load, five cents per hundred. Here comes in this question of good roads, and the man that is in the dairy business will appreciate it. The idea is that the patrons will pay for the delivery of the milk to the creamery or the skimming station. I have known some cases where the work was small where the creamery would have to pay the hauler more money than what would come from the patrons. I have known some where I would pay the hauler per month to haul, and would charge the patrons so much per hundred. I have cases where there was a little profit to that, that is, I would not pay out as much money as I would receive. But that has not been my object: all I have tried to do was to come out clear and avoid being out of pocket any more than I received.

Mr. Thomas: Would it pay if you had to pay ten cents per hundred for the delivery of the milk?

Mr. Gurler: If your patrons will pay that: that is a matter for you to adjust with your patrons. Find out from your patrons what they can afford to deliver that milk for.

Mr. Price: I was very much taken up with Mr. Ruddick's address. I would like to hear more on the ripening of cream. I do not think it is thoroughly understood. I think the point to be arrived at is the amount of acidity in the cream.

Mr. Gurler: I recommended yesterday, cooling the cream from the separator to 55 degrees or below. I know that there are men in the United States, and men in Canada, who are not cooling the cream below 70 degrees and letting it ripen at that temperature, and who claim they are getting just as good results. When the conditions are perfect you can get just as good results, but if you have off-flavored milk—milk that has stable odors in it—you want to drive those odors out. I claim it is safer to separate it at 90 degrees, and immediately cool it down. When your milk is perfect you do not need any starter. Now that question of ripening of cream. I hardly know what I can say to make it any plainer than I did yesterday. In a general way cream is ready to churn when it begins to thicken. Do not allow it to stand until it will show whey either top or bottom. When it has gone that far it has gone too far for the best flavor.

Mr. THOMAS: I have noticed that sometimes in the hot weather the cream will thicken before it develops the proper acidity, and it gets a very undesirable acid or rather no acid at all.

Mr. GURLER: You must have had something wrong. We are now in the field of the bacteriaologist. You get off-flavored butter when you find this condition. I do not know of any practical relief. I think the only thing you can do is to churn the cream I would not wait for it to develop any further, because you are going from bad to worse.

Mr. PRICE: We often meet with those conditions, and if we watch it and check it it is all right. Sometimes it will develop during the night. If we could tell what time to check it there would not be half the trouble,

Mr. GURLER: In a well managed creamery you learn at what temperature you need to have that cream before you have it just about right for the following morning. I cannot lay down any arbitrary rule. You have to use your own sense and judgment in those matters. A man who will do some thinking can help himself out, and the man who will not do any thinking will have to get out. (Applause.) I have no sympathy with this matter of making butter-makers in a week. I have been in the business for thirty years, and I am learning yet. I have learned a great deal since I came here.

Mr. THOMAS: Is the cream delivered to the creamery from the skimming station daily, or how often?

Mr. GURLER: My practice is to have it delivered right after dinner, and have it cooled down just as cool as we can cool it with water. We have the wagon so constructed that we can hold the temperature of the cream, and get it into the creamery at 2 o'clock in the afternoon, and have it no warmer than 55°. It has got to come every day? We must not leave the gate open or the bars down.

Mr. SMITH: I have sometimes known the makers being found fault with for not working their butter properly, and they say, "How do you know when it is worked properly?

Mr. GURLER: I was the first creamery man in northern Illinois to practice the once working of butter. A large maker visited my factory, and he told me that he was only working his butter once, and he was getting a top price for it. I have had men in my neighborhood who would get up and say they could tell from the looks of the butter when it was worked enough, but I have repeatedly found those wise men with mottled butter. If I was going into butter-making now, I should time myself if I practiced once working. I would not trust to my own judgment to tell when the butter was worked sufficiently from the appearance of it. If twice worked you can tell when to stop.

Mr SMITH: In using the combined churn and butter worker, I find that with a large churning you can work your butter properly and better than you can with a small churning. You have to work longer with a small churning than you have with a large one.

Prof. ROBERTSON: It is not wise nor safe to mix up things that differ. We mix butter for two entirely different things. The main object in working butter is not to prevent or correct streakiness in the color. That is a very subordinate object. The main object in working butter is to secure the proper consistency and body for the export trade. For the local trade, where the butter is consumed in a week, it does not make any difference, as long as it just sticks together, but if you want to send the butter to England it must be worked twice. The cause of stickiness in a good many cases is that, when the butter is being washed, a very common practice has been for many butter-makers to leave the churn at perfect rest after the washing before the water is drawn off, and by doing so a sediment of curd is created all around the sides of the churn at the bottom of the butter, and the butter particles will work through that, and those particles of curd will cause a streakiness in the butter. Where the butter is washed, the water should be drawn off after the churning very quickly, and then the better left after that for at least 20 minutes, before taken from the churn at all. Streakiness and other things are caused by working immediately after churning. Salt will make butter of a different color. You must distribute your salt evenly. I have known butter-makers to throw it down in handfuls ; that means you must do more working to get it thoroughly mixed. I am more of a butter-maker than a cheese-maker, although some of you do not think so. We made about 500,000 pounds of butter last year. A butter-maker must not work his butter a second time unless he has the butter fairly cold, not above 50° if practicable, and then work the butter on a table until, when the butter is bent over in working, it will bend more than half over before it breaks, and then stop. When it gets into that flexible state that it will bend half over before it breaks, it is all right.

Prof. Robertson : No less than five hours should elapse between the two workings. Mr. Gurler said yesterday, in his excellent address, that in the making of that process butter, the texture of the butter was grainy. Now, in the making of oleomargarine, the butter fats are all heated and are then put into a granular stage : the melting point of this butter fat is very low so that, if you begin to work that butter or butter fat immediately after the granulation takes place, you will find then that grainy condition, or a melting point of about 70° . If you leave the very same granular fat for about two or three hours, the melting point will go about 20° higher, by a secondary crystallization instead of butter fat granules. The making of butter is not quite the same, but at the same time nearly the same results occurs ; so that if you leave the butter fat in the churn 20 minutes before working, you get the butter granules, and have the satisfaction of having their butter waxy.

Mr. Brown : How do you convey the skim milk to the patrons ?

Mr. Gurler : I have been using a check pump in some of my creameries. I want to add to what Prof. Robertson said about twice working. There is no doubt you should do it for the export trade. You will get the butter in the condition that the trade demands, and, if I was making butter for the export trade, I would not consider for a moment upon that point. In fact, if I wanted to make the finest butter I could, I should work it twice, but we get more weight in the butter by not working more than once, and that is the key to the situation of the creamery man ; he gets more water in that butter by working only once.

Prof. Robertson : But if he had to hold that butter four months he would not.

Mr. Gurler : You are right there.

Mr. G. H. Barr : Would you work butter twice in the winter time ?

Prof. Robertson : I would for the export trade, and would not for the Canadian trade. Where it is sent out in small packages, or pound prints, you cannot get the waxy texture in the butter unless you work it twice. If I had a local trade, I would work only once and salt it in the churn. In that case you can hold four per cent. more water ; and, as long as the butter is not to be held, it is all right.

Mr. Barr : The reason I asked that is, because in my opinion it is better to work winter butter only once. There is not one of our creameries in the winter time that is able to hold the butter at the proper temperature for four hours. I know, at the Black Creek creamery, we have found the tub sitting on the floor will be harder at the bottom than the top. We have been shipping butter to the English market for the last four or five years, and when Mr. Ballantyne returned last year, I asked him if we could do anything to improve the butter—if there was anything the English people could tell us about making butter, and he said "No." I have not worked the butter twice since I started to make winter butter; so, I think, for winter dairying, when the English people cannot tell us anything wrong about the butter we provide, we are on the right line and I would not like to change. I work twice for summer butter.

Mr. HUNTER: In connection with the dead air space in hollow wall, I may tell you that last season I built a room and I went to the trouble of putting a hollow wall in it, and I thought, and others thought, that the dead air space should have ventilation, and I went to the trouble of putting in several tiles on the top. Had I better stop up these ventilators?

Prof. ROBERTSON: The only value of air as an insulating substance is to have it perfectly still. Every opening in it is a weakness rather than a gain. About working butter twice, I have known cases where butter worked once has been of excellent body; but I have known five or six cases for one where it has not been of excellent body. As a rule, it pays to work butter twice. If I had any convenience for keeping butter at a fair temperature I would always follow this practice; I would have the butter left in the churn after it is washed, the water run off very quickly and until it is drained reasonably dry for about twenty minutes; then I would mix salt with that as carefully as I could and leave if for a couple of hours and then work it, and by these means I would get nearly the same benefit as two workings, without the risk of having the butter too cool in the second working. I want to make this further observation that, while the English importer and the English consumer may not have any pointers to give us on the making of butter, the fact still remains that we are only a third rate or sometimes fourth rate factor in the point of quality in the British market now. That is, our very best creamery butter from Canada sells still for about twelve shillings below the price of the Danish butter, and sixteen shillings below the price of the French butter. We have a great deal to learn in butter-making, and I tell you our winter butter and summer butter going to England is a far inferior article in quality from what it ought to be from the country we have got. The butter we make in our own creameries is no better than that made in any other creamery. We want to have the butter which will have that desirable waxiness, and which they have in Quebec more than in Ontario, and we want butter that will have that sweetness and flavor that we can only get in Canada by having cream delivered in a sweet condition and have it pasteurized. If we do not do this, we will find ourselves far behind the Danes and the French in getting a big price in England. We are doing very well. I had an account sales myself the other day, not extravagant. It was fair selling at one hundred shillings. Some people sell higher than that. At the same market I had reports of Danish butter selling for one hundred and eleven shillings. We are three cents behind them, and we can well make improvement to catch that higher price.

D. W. LEITCH: Has a cow any influence in making good butter, or has the grass any influence on the quality of the butter? I have had forty years' experience in farming. I have a dairy, and I have several cheese factories, and I find there is a difference in the cheese we are making in these different districts, because the soil is different and the grass is different. I think that if we are going to improve in this matter we must get the right kind of a cow. Of course we do not say anything to the farmers at these conventions, but I say you cannot make a first-class butter out of dairy milk if the cow is not suitable for the business, and the grass is not suitable for the business, and the food not suitable. We have a miller in our neighborhood who, for several years, has been getting Manitoba No. 1 hard wheat which he mixes with the wheat we grow here, and everybody is running after his flour. He says he cannot make it out of our wheat. I contend that if we are ever going to advance in the making of our butter we must get first class cows and first-class grass. In our county we grow a great deal of clover, and can detect a difference in the quality of the cheese when we commence to feed that clover. The narrow-leaved grass makes a softer, nicer cheese than the clover will. The clover will make the butter hard and the cheese hard. We have a dairy of our own on my place, and when the temperature is favorable and the food favorable, we have no trouble in making first-class butter. I say here in Ontario we should look to the different grasses more than we do, if we ever expect to excel in dairying, and we must cultivate the soil in a different manner, and we must make cheap cheese. If you have a good cheap article you will sell it. We are contending now with every nation on the earth for that market of Great Britain, and we must show them that we can excel them. A few years ago the Americans sent a much larger quantity of cheese than we did; now they do not send one-quarter—they are just going behind. If we intend to keep our position we must improve. The cheesemaker is an important being; he is a very intelligent man. I believe we have just as good butter makers in this country and just as good class of cheesemakers, but the farmer is behind. He never goes out to a meeting, so we must try and get at him; we must try and get him to provide himself with a good cow and good grass and show him how to feed that cow. That should be the very first beginning in dairying. We must raise plenty of corn, and have a big silo for the winter and another little silo for the summer. I contend there is no better cheese or butter than is made from silage.

Mr. KEELER: Should cheese be greased before they are boxed? That is after taking the cloths off?

The PRESIDENT: It altogether depends upon how old the cheese are. If they are new and being shipped very young, I think it is a good idea to grease them.

Mr. DERBYSHIRE: In the east we have circles made out of thin bandages, cut exactly the size required; we press these on the ends of the cheese and leave them there, and we never grease them. They go right through and shine beautifully, and when you strip the top and sides off, the cheese is just like a new onion in June. You can buy these the same as bandages from all cheese supply dealers.

The PRESIDENT: In judging cheese all over the country I find they are put up differently in different places. Through the eastern country they have the bandage over the top. Here in western Ontario we use heavy cloth, and, just before shipping, take that off and wash the cloths and use them again. It is just a matter of economy. The cheese in the east with the cloths on top are, I think, very much nicer, and, I think, if we adopted that system here, it would be a step in the right direction.

Mr. MILLAR: How do you like these cheese in boring them? Do you find the cloth a disadvantage?

The PRESIDENT: Yes, I find that a disadvantage.

Mr. DERBYSHIRE: Have some boy at seventy five cents a day to go along and remove this cloth from the top.

Mr. MCFARLANE: At our factory, when the milk is dirty there is nothing said about it, but it is sent home, and I think it is a bad practice to name the person sending dirty milk.

Prof. ROBERTSON: Personally I am indebted to Mr. McFarlane for a great many practical points that he has given me in conversation. There are two things I want to emphasize. There are little minor differences in the qualities of butter and cheese due to the breed of the cow, and due to the kinds of grasses the cow eats, and due to the climate where the cow lives, and there are two big things we should bear in mind in Canada. One of these is that the quality of butter is always improved, and the butter easier made, when the cow gets any kind of juicy food. Therefore, the cow should have ensilage in the winter or carrots and mangels. You cannot afford to carry on winter dairying without one or two of these things. Another point I want to make is that you will find a great deal of advantage in having cows nearly fresh calved. I have put all the cows that were calved more than nine months, and then those six months and under that, by themselves, and the butter made from these different divisions of cows, on the same kind of feed, was distinct and different, and then by adding the milk of a few fresh calved cows to the old cows' milk you get that nice flavor which butter needs to have.

A MEMBER: The pasteurizing will drive off the turnipy flavor; will it not void the fine flavor of the grasses?

Prof. ROBERTSON: Pasteurizing will drive off the fine volatile flavor, but, for butter to go to England it should have that aroma that comes from proper fermentation. In winter time you have so many things in the cream, through the stable and the cows, that pasteurizing will stop, and it is better to lose the little than the large.

Mr. MCFARLANE: Have you ever had any experience with cream that sweats?

Prof. ROBERTSON: I have had cream that had little globules all over the top of it; that is caused by certain fermentation that gives the butter an odor. It is better not to have cream in this condition. If I had cream like that I would pasteurize it before I mixed it with other cream.

Mr. THOMAS: White specks appear in butter, especially in the winter time; these white specks settle at the bottom of the churn and mix through the butter, and I find the only way to get rid of it is to take the strainer and lift the granules off.

Prof. ROBERTSON: A good plan to correct that is to keep the cream covered while it is being ripened so as to prevent any drying out. If you have the surface of your cream dried, it causes a scum, and this does not break up. You prevent it still further if you will strain the cream into the churn through as fine a strainer as you can get it through.

Mr. GURLER: Your trouble is that your cream has become sour. I find the best way to get rid of specks is to stop your churn when the butter is not cold and is still in that granular form, and draw off your butter-milk, and when you come to wash, after you have agitated your churn stop it for a minute or two before you draw out your wash-water. Do not let your butter settle down so as to clog, and let those little deposits of curd stick to your butter. Leave your water in there, then add some more water and do not agitate your churn a second time. Turn the water around with the hose, that will break up the butter and liberate those particles of curd, and then you can draw them out with the wash-water.

A MEMBER: Do you prefer salting the butter on the worker or in the churn.

Mr. GURLER: I prefer salting on the worker.

Mr. CLARKE: With these head-cloths on the cheese would it be necessary to use two scale boards?

The PRESIDENT: I think it would be unnecessary, but at the same time I think it is a good thing to have two scale boards.

A MEMBER: What would be the cost of these cloths?

Mr. RUDDICK: The use of the capping cloths has become general east of Toronto. I am satisfied they are a most excellent thing. The makers down east would not think of going back to the old method of removing the cloths and using them over again. They cost about seventy-five cents per hundred.

Mr. CLARKE: I have found this mode practiced by some makers: they would use two capping cloths. I like to see a nice finish on cheese. I found a cheesemaker once who put some water on the ends of the cheese and left that there till he finished the bandage, by which time the cheese had got cold. I believe it is a good plan to tighten down the cheese just as soon as it is bandaged. Tighten it right down as soon as it is worked.

Mr. RUDDICK: In many cases where these cloths were tried in Western Ontario they were not properly used. They were put on top of the cheese and the bandage folded across the top of the cheese—that is not right. If the capping cloth were brought just about to the edge of the cheese and not over it, it would be better. In using these cloths it is necessary to use hot water to soften the rind of the cheese a little so that they will adhere.

Mr. KEELER: Do you not think, if you used the thicker cloth the cheese would b cleaner when you shipped them?

Mr. RUDDICK : No, I do not.

Mr. McALLISTER : I was speaking to a manufacturer of cheese in Michigan, and he advised me to use heavy cloth instead of light surface cloth. We have circles that cost only $2 per thousand. I buy factory-cotton at the stores in the web and manufacture my own head-cloths for less than $2 per thousand. I think in buying in quantities you can manufacture your own head-cloths cheaper than buying them cut. I take my web of cotton and lay it out about four yards in length, fold it and then mark out a circle and cut it with a pair of tailors' scissors, and I can cut up a web of cotton in about twenty minutes.

Mr. DERBYSHIRE : We have a die that cuts 100 of these at a stroke, so that when they drop down they have a stylish appearance which is very much prized. You cannot afford to make them yourself, because you can buy them cheaper than you can make them.

Mr. YOUNG : A gentleman who spoke down here left a slur upon cheesemakers that should be removed. He said he found cheese in a factory slightly cracked. If his cheesemaker was using a gang-press it would not be so. If a man has a cheesemaker of that kind, why does he not dismiss him at once, and not come here and make people believe that all cheesemakers are like that.

A MEMBER : I did not say all cheesemakers were that way. I said I thought the difficulty was in not tightening down the cheese after they were bandaged.

A VOTE OF THANKS.

Moved by Mr. DOUGAL LEITCH and seconded by Mr. JAMES CARMICHAEL : "That the thanks of this meeting be tendered to the Mayor and Corporation of the City of London, for their handsome donation of $150 towards the expense of holding this convention." Carried.

SELLING CHEESE FOR FUTURE DELIVERY.

Moved by Mr. WILLIAM LOCHEAD, seconded by Mr. JAMES A. JAMES : "That, in the opinion of this meeting no law should be enacted to prevent the selling of cheese for future delivery, as provided by the Bill proposed to be introduced to Parliament by Mr. Parmalee, until such time as the Dairymen's Board of Trade in Canada have had ample opportunities for considering and expressing their views on the subject." Carried.

ELECTION OF OFFICERS.

The election of officers was then proceeded with, and resulted as given in Appendix.

The PRESIDENT : In retiring from my position as President, I have to thank each and every member of the Butter and Cheese Association for the kindly manner in which they have treated me during my term of office. I have also to thank the directors of this Board for the very kindly manner in which they have treated me and also the inspector and instructors and also the press. They have always been willing to do all in their power upon every occasion. I may say, in stepping down and out of the President's chair, that I will do, as I have done in the past, everything in my power to advance this cause, and I can tell the cheesemakers and patrons that if I can ever assist them in any way by my advice or assistance, I am always willing to do so. I have very much pleasure in calling upon Mr. Eagle to come forward and take his position as President of this Association. Mr. Eagle is, like myself, a practical cheesemaker, although he is engaged more extensively than I am. I think he has shipped about $70,000 worth of cheese during the last year. I have been on the Board with him for a great many years, and we have always relied upon his advice. I recommend him to you as a man of good judgment. I have now very much pleasure in introducing him to you and, before sitting down, I wish to thank you again for the very kind manner in which you have treated me since I accepted the President's chair. (Applause.)

ADDRESS OF THE PRESIDENT ELECT.

By Harold Eagle, Attercliffe.

I can assure you that it is with considerable embarrasment I rise to thank you for the honor you have conferred upon me in electing me President of this Association. Our retiring President is a member of the Dominion House of Parliament; his immediate predecessor was a member of the Local Legislature, one other ex-president was Speaker of the Ontario House of Parliament, and I think I am safe in saying, that looking back along the line of presidents this Association has had, that almost without exception they have been men who were actually engaged in municipal or parliamentary affairs. In looking back to these men it is with some embarrasment I accept the position. Parliamentary honors I have never looked for, and I have never seen any municipal service. I have not even been pathmaster or poundkeeper. In electing me your President you have made a new departure in one or two particulars. In the first place, I may say that I believe I am the first man to be elected to this position who did not live in one of the main dairy districts. I live in what they have always recognized as an off district. I want to assure you that I will do the best I can to further the interests of, not only the district I represent, but, as all the other presidents have done, do the best I can for the interest of dairying in this western part of the Province of Ontario.

I think I can safely say that I am the first man you have honored with this position that started in the business as an everyday plain cheesemaker, without friends in court, and who has adhered strictly to the manufacturing side of the business. I take it as a compliment, not to myself but as an inducement and an encouragement to other members of the Association. We have a number of young men in the Association who meet with the same difficulties that I did less than twenty years ago, and I think I am elected as representing the cheesemakers and as an encouragement to the younger men. If there is one thing in my mind more than another at the present time, it is the remembrance of the first Convention I attended. I believe I will tell you about it. It was less than twenty years ago, in the town of Ingersoll. While walking along the street I saw men with badges on the lapels of their coat. This was in the days when the Convention was always held in the town of Ingersoll. I enquired as to their business, and was told they were the Canadian Dairy Association assembled in convention in the town hall. I went to the afternoon session. Our old friend Caswell was at the door. I remember, as I walked in, I saw one or two men sitting at a table and some badges and ribbons in one cigar box, with some dollar bills in another. They were about one-third through the afternoon session, and, as I stepped in, I asked if there was any price for admission. Mr. Caswell looked at me and said: "It is a dollar for you." Now, like a young man we read of in Scripture, I was turned very sorrowful away, but for a far different reason. When he asked for a dollar I turned away because I did not have a dollar I could call my own I remember the speaker was Prof. Arnold. At that time I knew nothing of milk, cheese or anything else. The speaker was stating that at that time the exports from the United States was double the output from Canada, and he stated clearly and distinctly that the time was coming when the Canadian exports would equal that of the United States, and he also stated that he believed the time was coming when Canada would exceed their output; and I believe I am safe in saying that our output is more than twice theirs now. At that time the output of the United States was more than twice ours. I assure you that I will do everything in my power to further the dairy interests in Western Ontario, and the interests of the Butter and Cheese Association, of which we are so very proud.

DAIRY LEGISLATION.

BY PROF. J. W. ROBERTSON, COMMISSIONER OF DAIRYING, OTTAWA.

In speaking of dairy legislation, I think I may call this convention the Dairyman's Parliament for Western Ontario, and ask you to resolve yourselves into a legislative body to consider whether any further legislation should be passed for the dairying interests of Ontario.

All laws dealing with commerce should aim to prevent fraud. As far as possible they should protect the public interest against injury, even if no fraud be intended. When a man occupies the honourable position of a legislator, it is his duty to obtain all possible information of the facts bearing on the subject under his consideration. It is also clearly his duty to take counsel with those who carry on the business or businesses likely to be affected by any legislation he may promote. No man can stand outside of any business and say : "I think so and so should be done for its benefit," with the same certainty of being right as can the man who is actually engaged in the business. In the legislation of late years, so far as the Department of Agriculture is concerned, an effort has been made to obtain information from the people engaged in the business, and then to crystalize what they need into a law which will benefit them and do no harm.

The Dairy Products Act, 1893, was passed to meet a threatening danger. I was told that several large concerns in the United States were getting a price on property in Canada for the purpose of establishing factories in which to make "filled" cheese in Canada ; that is to make cheese by mixing skimmed milk with lard, purified butter or other fat. The law does not permit anyone to make oleomargarine, butterine, or any of those imitations in Canada. So this further Bill was passed to prevent the making of "filled" cheese in Canada. I do not believe that a single box of filled cheese has been made in the country since that time.

It was thought proper to include in the law a provision to prohibit the fraudulent branding of the word "Canada" on cheese not made in this country. It was not an uncommon thing for cheese from the United States to be brought into Canada, and then to be shipped out of Canada with the name of "Canada" on the boxes. I know of cases where shippers handling such United States cheese were compelled to take the word "Canada" off the boxes and to put the words "Produce of the United States" on. Since the law was passed, if anyone falsely marks cheese or butter with the name of "Canada," he is liable to a fine not exceeding $20 and not less than $5 for each box of cheese or box or package of butter.

It was further thought desirable that the name of the country from which the cheese came into Canada should be plainly marked on the package. The Government employs an inspector at Montreal to see that all butter and cheese coming from the United States in bond shall be branded "The produce of the United States" before it is exported from Canada. I think there is no doubt that the law of 1893 was beneficial legislation and beneficial only.

Tho Dairy Act, 1897, was passed to provide for the registration of cheese factories and creameries, and make the branding of the word "Canada" or "Canadian" on all cheese or butter intended for export compulsory. There had been a widespread agitation for two years on the subject of the branding of the date of manufacture on cheese. There was much conflict of opinion as to whether the date of manufacture should be branded on the cheese or not.

The branding of the date of manufacture was not made compulsory by the Dairy Act of 1897. However, Section 6 of the Act prohibits misrepresentation as to dates of manufacture. It is as follows :

6. No person shall knowingly sell, or offer, expose, or have in his possession for sale, any cheese or butter upon which, or upon any box or package containing which, is printed, stamped or marked any month other than the month in which such butter or cheese was made ; and no person shall, knowingly and with intent to misrepresent, sell, or offer, expose, or have in his possession for sale, any cheese or butter represented in any manner as having been made in any month other than the month in which it was actually made.

The penalty for violation is a fine not exceeding twenty dollars, and not less than five dollars, for every box or package, sold or offered or had in possession for sale, contrary to the provision of that section.

However, there was an evident desire on the part of the owners of cheese factories and creameries to have legal provision whereby they could brand on the cheese and butter produced at their factories a registration number, and be assured of protection in the exclusive use of that number. It was not thought desirable to make the use of a registration number compulsory. It is quite optional. But it provides the means for identifying the product of any factory by a registered number, the owner of such factory having the exclusive right of using it, practically as a trade mark. If any factoryman has what he considers to be extra fine cheese or butter, and desires to preserve its identity, he can do so now. The law forbids the removal of the registration number under a penalty not exceeding $20 and not less than $5 for every box or package. That provision of the law has already been taken advantage of to a large extent. Up to last week we had received applications from 394 factories and had issued registration numbers to 378. The registration is free.

The law of 1897 makes compulsory the branding of "Canadian" or "Canada" upon every box or package of butter and cheese exported. In the case of cheese the word must be branded on the cheese itself before it is taken from the factory where it was made. The British law requires that the packages containing cheese or butter shall be branded with the name of the country of their origin. Some time ago, large Cheddar-shaped cheese, of one hundred pounds and over, were made in Canada and doubtless afterwards retailed in England as Scotch or English Cheddars. The retailers would get from four to six cents per pound more for it than the price at which they were retailing Canadian cheese, but nothing of that four or six cents came to Canada. The injury to our cheese is wrought by the consumers being made to believe that the cheese that they use and pay a high price for is not Canadian although made in Canada. I think it is important that the word "Canada" be branded not only on the box, but on the cheese itself, and still better that it be stamped into the cheese itself, so that the word "Canada" would be apparent to those who saw the cheese uncut in the retailer's shop. It would be a good plan to have the word "Canada" or "Canadian" pressed into the end of the cheese while still in the cheese press. The indentation of the letters need not be more than one-eighth of an inch deep into the cheese. Any cheese maker who lets any cheese, out of his factory in 1898 for export without the word "Canadian" or "Canada" on each one is liable to a fine. A few people who do not know the trade may complain that this is harassing legislation. They are, perhaps, cousins of the people of whom John Bright once spoke when he said that there were people in the world who thought the ten commandments the most harassing legislation that was enacted, because they seemed to run counter to their own peculiarities so often.

I now come to speak of the Bill which was introduced into the House of Commons by Mr. Parmelee last year. It was intituled "An Act to prohibit improper speculation in the sale of butter and cheese." The Bill deals with the commerce of butter and cheese, and as soon as you touch anything that concerns the bargain-making of the people, you touch something that should be dealt with in a most careful and cautious way—but not in a cowardly way. The careful way to deal with many matters which are known as abuses is the way we used to deal with nettles. When you take them with a right good grip they don't sting.

All bargain-making, which is fair commerce, consists in arranging for the exchange of things. All commerce which is honest is the exchange of things. If there is nothing to exchange there cannot be a fair transaction. I may bet on a horse race if I want to bet, but that is not commerce, there is nothing to exchange. The one who gets the money gives the one with whom he deals no equivalent. In the exchange of things in our system of civilization, there are usually the three classes—the producers, those who are called middlemen, and the consumers. The producers of cheese, for example, are not merely the men who manufacture the cheese in the factories, but they include those who keep the cows, the milk drawers, the men who make the wagons and harness, the men who make the machinery and erect the buildings and scores of other productive workers. These men who are known as producers are seldom able to act as their own middlemen with advantage. In a few cases the farmer can carry his own butter, cheese, eggs and other things to the market, and in the market find the actual consumer willing to exchange money for them. But in most cases there must be some one to do the work of distribution. He is known as a middleman, a buyer, a merchant or a distributor. The carrying companies who transport the cheese and other products from one place to another, are also middlemen. How are the producers in Canada to reach the consumers in Great Britain, unless there be some middlemen in Canada to render the service of carrying the products from here to the consumers? I have no sympathy with the agitation which is sometimes raised for doing away with the middlemen. They are just as necessary for the production of wealth in Canada as are the producing workers. The middleman is a useful person in his place; and so long as he does his part of the nation's work he is fairly entitled to be well paid for his services. But he is not entitled to any more than his services are worth.

Let me illustrate the difference between a middleman who renders services in commerce and a middleman who obstructs commerce. In the olden times a traveller from the north of England to London had to go by stage coach, and he might carry some of his goods with him. He had to pay something for coach hire, and had to pay directly or indirectly for tolls on the road. That was paying for the capital and labor of the men who made and who kept the road. At a certain stage of the journey, in the vicinity of Epping forest, where the notorious Robin Hood drove his money making business, there stood two men, one on each side of the road with old fashioned pistols. They made the traveller stand and deliver to them. They did not render any service to anybody in connection with travel or commerce. They simply took the traveller's money because he could not help himself. There are men in Canada now of that order, who stand in the highways of commerce, and make the toilers stand and deliver to them. I say the law should abolish the trade of these men, not of the men who keep the tolls or drive the coach, or render any service, but of the men who stand and say, "deliver." The law should speedily and surely abolish those men, and their occupation. It is incorrectly said that such men in commerce are speculators. Not a bit of it. Speculation is a legitimate and necessary part of commerce. When a man buys cheese in June and does not intend to sell it until September, he buys it in the hope of a rise in the market; he is speculating, that is, hoping for a profit. That is legitimate speculation—wholesome business. Such a buyer gets possession of something, and every pound of butter or cheese which he owns as a speculator, makes him so much the more a factor doing all he can to keep the price up. Cheese may be selling at nine cents or at any other figure per pound at that time. A man may not buy any cheese in June at all, but he may say to himself: "I see a good chance to make some money without doing anything, a chance of getting something for nothing. I will offer to sell August cheese for delivery in September at 8½ cents." Forthwith he makes an offer to sell August cheese for 8½ cents, and telegraphs that offer to a score of houses in Great Britain. He has not put a cent of money into cheese; he does not own a box of cheese; he does not render an iota of service in the development of the cheese trade. He has merely offered to sell August cheese for delivery in September at one-half cent under the current price. It may be that nobody in England accepts his offer; but the firms to whom he cables will be led to say: "We have bought June cheese at nine cents, and here we are offered August cheese at 8½ cents; humph! we will not buy any more cheese just now." When anybody sends a cablegram or any other communication offering to sell "futures" or to sell "options," if they are accepted, his whole power and influence are used to weaken the market. He is merely betting that the price will be lower, and then he uses every means, fair and unfair, to make it lower. He is not a necessary middleman in commerce, any more than the highwayman is in travel; and civilized nations having abolished the one, are now confronted with the duty of preventing the other.

The matter of selling options or futures is not a theoretical evil; it has been a grea injury to the trade during the past, and to a less extent, during some former seasons. At a meeting of the Directors of the of the Board of Trade of Montreal held a week ago, the president said that he deplored the practice of selling "options" or "futures" in cheese and butter, that he thought that the practice was on the increase, that it was getting to be a grievous injury to the trade, and that last year it had done a great deal of damage.

The practice of selling "futures" in cheese and butter works also another injury to the trade in these products; it helps to level the price down, and in some measure to prevent the man who has exceptionally fine goods, from getting as much of an advance over the common quality as he would otherwise obtain. Let me give you an instance. If May and June cheese are selling at nine cents, and about the middle of June, when the price is nine cents, one of these sellers of "options" or "futures," has reason to believe that cheese will go cheaper, he may cable to twenty people in Great Britain, offering to sell to each firm one thousand boxes of July cheese at eight cents. He does not own a box of cheese, but in June he may cable offering to sell 20,000 boxes of July cheese at eight cents. If even a few of the firms to whom he cables accept his offer, what will be his policy? To bring down the price here below eight cents, so that he can buy for less. If he cannot do that, what then? Why, to buy the cheapest cheese he can find regardless of quality and tender those on his contracts. He would not cable to deliver "A1" fancy cheese, and thus he will be in the market to buy cheese of any quality that can be tendered on his contracts at all. That practice tends to average the price down, so that the cheese from the poorest factories may be paid for within one quarter or one half cent a pound, from that from the best factories.

Yesterday, at the convention, I heard somebody ask: "Why don't the merchants discriminate against the bad flavors?" So long as options in cheese can be sold there will be buyers to take one thousand boxes and more, no matter what the flavour is like. The Bill introduced by Mr. Parmelee is intended to prohibit that kind of contract, the selling of "futures" or "options."

Clause 3 of the Bill deals with two matters; it reads as follows: "Every one who by hinself or through the agency of another person, (a) sells, or (b) offers to sell, or (c) agrees to sell, or (d) agrees to offer to sell, any butter or cheese which at the time such sale, offer or agreement is made, has not been manufactured and is not his property or the property of some person for whom he is duly authorized to act, is guilty of an offence, and liable on summary convictions to the following penalties:

"(a) For a first offence, to a fine not exceeding five hundred dollars or imprisonment, with or without hard labour, for not more than three months, or to both such fine and imprisonment:"

"(b) For a second, and any subsequent offence, to a fine not exceeding one thousand dollars, or to imprisonment, with or without hard labour, for not more than six months, or to both such fine and imprisonment."

You will observe (1) that nobody shall sell, offer to sell, agree to sell, or agree to offer to sell, cheese or butter which is not then made. What harm can that work to anybody? If everybody is prohibited selling July cheese until July cheese is made, whose interests will be injured by that prohibition?

(2) The Bill practically forbids anybody to sell cheese or butter unless it is his property, or the property of some one for whom he is duly authorized to act. Why should any one claim a right to sell what he does not own? Even if the bill should go so far as preventing factory salesmen from selling cheese or butter before it is made, I think that would be a good thing. I think the factoryman does not gain anything on the whole by selling his butter or cheese before it is made. But the Bill exempts the salesman of the factory in clause 6. It reads as follows: "Nothing herein shall be deemed to prohibit any person who is duly authorized to act for the person or persons who supply milk to any dairy or butter or cheese factory, from selling, or offering to sell, or agreeing to sell, any butter or cheese to be manufactured at such dairy or cheese factory or butter factory.'

A salesman may rightly be exempted because he represents the material and means out of which and by which the butter and cheese will be made. So if a factory salesman contracts to sell his cheese or butter before they are made, this Bill will not interfere with that action.

I would move that this Bill be now considered as being before the convention for discussion. I shall be glad to send a copy of this Bill to any one who desires to examine it. Personally I am strongly in favour of legislation along this line, and I would like similar legislation passed in reference to sales in wheat and other farm products.

Mr. J. BLANEY : Has that Bill ever been before Parliament?

Prof. ROBERTSON : Yes, it was introduced last session, but not passed.

Mr. BALLANTYNE : How would you enforce the infraction of the law?

Prof. ROBERTSON : A copy would be sent to every importer in England, and if every British importer knew that he could not compel the delivery of the goods, he would not offer to buy "futures," and nobody would make offers.

Mr. BALLANTYNE : The trade could still be carried on.

Prof. ROBERTSON : Half the penalty is payable to the informer and half to her Majesty; and that, I think, itself would bring about information to stop the practice.

Mr. J. W. LEE : I have been delighted with the speech of Mr. Robertson as well as that of Mr. Campbell; and last night I was delighted with Mr. James' speech. He opened our eyes, and now Prof. Robertson has told us to-night that oleomargarine cannot be manufactured in this country, and that no "filled" cheese could be manufactured in this country, because it would damage to a certain extent the dairy industry of this country. There is one industry that is being ruined in this country, and that is the wool industry. There is too much shoddy made. And I think oleomargarine and skimmed cheese are the shoddy of the butter and cheese industry. I think it would be well for our Ministers of Agriculture to inquire into these things a little and see if we cannot be in some way protected from shoddies and adulterations of different kinds. Our cheese has to go unadulterated; our grain and our farm crops have to go unadulterated; but do we buy things unadulterated? No; we do not. If you examine our groceries you will see adulteration in almost every thing.

A MEMBER : How would you prevent speculators from cornering the market?

Prof. ROBERTSON : I do not think this Bill would prevent fair speculation in cheese buying. If men buy any kind of goods, and hold these goods to corner the market, the effect is to raise the price; and every man who spends his efforts in that direction will do the country good.

Mr. BALLANTYNE : I think it would be very difficult to regulate this "short selling" in the manner suggested by Professor Robertson. I know as a matter of fact, that a great deal of "short selling" is not done directly from Canada, but is done by men in England on behalf of men in Canada, sometimes not always on behalf of men in Canada, frequently by men in England who are importers from Canada. The trade has got largely into the hands of men who do that kind of business and, during the past season, there was probably more of it done than ever before. The system suggested would be one by which Canadians would be prohibited from doing that kind of business, and men in England would get it all. It is not easy to detect the men who do this trade, the cables are always in cypher.

Mr. ALEX. McKENZIE : Has that Bill been up before all the cheese boards and cheese factories?

Prof. ROBERTSON : It has been printed in the newspapers and sent to representatives of all the cheese factories and creameries we have the addresses of.

Mr. A. WENGER : Your law effects the exporter, still you allow the manufacturer to sell. The man I sell to, buys this cheese from me before it is made, and your law prohibits that man from selling it until it is made. I do not see where the fitness of it comes in. If he can buy that from me, why should not he have the right to sell it again before it is made.

Prof. ROBERTSON : The law would not touch such a man, because there is nothing herein contained which prohibits any person who is employed to act as salesman for the patrons of any factory from contracting to sell the product of such a factory. If you contract with a man to sell the output of your factory, then he would have authority by that contract to sell the same. But he must have a contract with a man who is the respresentative of the people who own the factory and the cows. With regard to the matter raised by Mr. Ballantyne, the principle of the Bill is sound. It might not be easy to stop all the practices which the Bill is intended to prevent. It is not easy in any case to prevent altogether practices that are deemed to be wrong; but if the Bill be right in principle I think it would be possible to find a way and means to enforce it. A man in England would never have any advantage in selling Canadian cheese short, if he were prohibited by the law of this country from buying the cheese here. Then, in the second place, no one in England would buy cheese on "future" or "short sale" when he knew that, if the market went against him by the cheese going up in price, the Canadian seller could not be required to deliver the cheese.

. Mr. BALLANTYNE : I do not know as a matter of fact that men in England do sell largely in that way. They sell large quantities of cheese for future delivery, and they do not contract for them on this side at the time of sale.

Mr. J. BLANEY : I have read the Bill over carefully and I think it is as sound in principle as it can possibly be. I think the object of the Bill is simply to prevent the individual from selling something that he does not own, and that he has no prospects of owning. I have always noticed that Prof. Robertson lays down a sound foundation, and when he gets it laid down, he is not afraid to stand by it. I, for one, believe the Bill is in the right direction, and no straight forward man will oppose him. Of course we mus expect men who trade like eels to abuse the Bill. All eels, when they get into contact with a good, solid substantial law, will straighten out.

Mr. HATELY : After that remark, I have to rise and protest *in toto* against Professor Robertson's Bill; against the principle of the Bill and, more especially, against the idea that it is wrong to sell "short." It is just as right and sensible to sell "short" if, in your judgment, the price is too high, as it is to buy cheese for the purpose of selling it at a higher price later on, and doing your utmost to keep up the market unduly. Almost any of the salesmen could tell you that there has been more money lost by the producers from keeping up the price of cheese unduly, and the factory men being persuaded not to sell that chesse unless they could get a certain price. The principle of selling "short" is just as true as the principle of buying and holding for better price. If this Bill goes into operation it will enable speculators to corner the market, especially on summer cheese, and factorymen will suffer later for it. The tendency is to keep the price up and shove the price up, and then it is the few who have the nerve to sell short when it is almost impossible for the many to think the price will go down. Short selling helps to regulate the price and to force the product again into consumption. I must object to the Bill.

Mr. CREIGHTON : If you stop the Canadians from selling short you simply transfer the trade from Canada to Liverpool. It was once suggested to stop the "future" trading in Chicago, and it was vetoed simply because you would take all the future trading to Liverpool.

Mr. DERBYSHIRE : I have always been in favor of selling cheese every week; I have always advocated that, and, I believe it is the only true principle for a salesman to come forward and sell his goods for the highest money he can get, and have the goods go forward, and receive his money, and distribute that money among the people. We will receive more money for our goods just by selling them every week. We want to keep the goods in the hands of the consumer all the time. I know, as a matter of fact, that cheese was bought and sold this year before they were manufactured, and I believe it resulted in great disadvantage. I believe the factories received less money on account of these short sales than they would have received had they sold the goods every week.

PROF. ROBERTSON: The opposition that has been expressed to the principle of the Bill does not indicate that it is likely to be in the least degree injurious to Canadian interests. A man does no wrong now, selling "short," in the eyes of the law, because there is no law against selling "short;" but the question is, would not a law against selling "short" be a good law for us and protect us from the harm which that practice does now? Then it is said that, unless there be a chance to sell "short," some men will keep the market up unduly. I would like to see the patrons, the salesmen, the producers engaged in the cheese trade who would not be pleased at the market being kept up. Who ever heard of the market being too high for the producer? I never did. It is said this Bill would give buyers a chance to corner the market. What harm could that do, if they cornered the market by buying goods? If they own the goods their interest would be to keep the prices up. The market does not first go down at the retailer's end. The people in England are willing to pay sixpence and sevenpence per pound retail for our cheese. The market goes down, because some men bet that the market will do down and thereby destroy confidence. Then it has been said that it might transfer "selling short" from Canada to Great Britain. Let it do so. That would not hurt Canada; and if it hurt Great Britain the people over there are capable of taking care of themselves. I do not think that a man in England could sell Canadian cheese "short" and so do us any harm here. A year ago everybody in England, and on this side, said that cheese would have to go to a lower scale of prices because the English consumers were taking to canned meats and jam instead of cheese. But, by the middle of August, there was the biggest make of cheese we ever had, and, when I went into the shops in England, the storekeepers told me the people were buying cheese liberally. The consumers' demand was the best in years; and that was before the price fell. But the engineer's strike came, and selling "short" came, and mild weather and fine pastures in Britain came, and these made buyers timid and broke down the price. Nine years ago I said the time would come when we would export two million pounds of cheese and the British market would absorb them; and I say here, that in seven years' time the British market will take care of three million boxes of cheese from Canada if we make them all fine. It is the man who sells "short" that destroys confidence and prevents us from getting good prices. (Applause.) If the Bill is passed, and it does not prevent the harm that is being done to us, then we will have to improve the Bill. We are not quite willing to confess ourselves unequal to the needs of this business; and, if this Bill does not meet the case, we will find a Bill that will.

IMPROVED OPPORTUNITIES IN DAIRYING.

By H. B. GURLER, DEKALB, ILLINOIS.

I would like to state in starting out that this is a field in which I get lost myself. The improved opportunities in the farm and dairy are marvellous. The more I think about it the more I realize it. I always feel, when I have said what I can, that I have never done the subject justice. I always feel dissatisfied with myself.

That there is need of increasing the profits of our dairies all will admit. How to do it is an important question, one that thousands of dairymen are studying, and many thousands should be studying it that are not. With our present available information as to how we may improve in our work, we should and are improving faster than at any previous period in the history of the dairy work of our country. The dairy herd as we find it on the farm is the foundation on which we, as a rule, must build, or rather it is from that which we are compelled to select material for the foundation of our future herd.

There are many ways in which the profits of most herds may be largely increased. The first thing I would recommend a dairyman to do is to make himself acquainted with each individual cow of his herd. By this I do not mean simply that he should know each individual cow, but that he should know what quality of work she is doing for him. Whether she is making him a profit above the cost of food and labor or not. If she is not, learn why she is not. Whether it is her lack of capacity to handle enough food or whether she is not being properly fed and cared for.

When these points have been demonstrated we know what to do. It is an important matter for us to know whether the cows are being properly fed or not, and if not to remedy it. It is surprising to know that so many dairymen do not pay more attention to and know more about this point. The question of the capacity of the individual cow to do profitable work is not a simple one to determine, but this requires no more business ability than it does to make any other business profitable. The profit is what is left after expenses are paid; and the cow intelligently handled that leaves no balance to her credit after feed and labor are paid for should be sold, and one put in her place that will leave a profit.

There are herds of cows in this country that average 400 pounds of butter annually per cow, and herds in nearly every community in the dairy section that average 300 annually. These 300 and 400 pound dairies should be object lessons to other dairymen. What one dairyman or dairywoman has done another can do.

We should all use the scale and the Babcock test on each cow of our herds. In this way we shall know what each cow is doing, and this is the only practical way of knowing. It is necessary that we know what it costs us to feed a cow a year. To this add the cost of labor and then balance the account and see whether the balance is on the right side or not.

I find it unprofitable to keep cows that do not produce above 200 pounds of butter annually. I might have 100 cows on my farm that would produce 200 pounds of butter each annually, and not make anything from the whole herd. We will put the cost of feed at $30, labor at $10, interest $2.50, and we have $42.50, from which we will deduct $10.00 for skim milk, leaving $32 50. We will put the average net price for butter at sixteen cents per pound, and we find we must have 203 pounds of butter before we have any profit for ourselves.

Now, please tell me what sense there is in keeping cows when we know there is no profit? Or, I might say, what sense is there in one not knowing what cows pay us a profit and which cows do not pay a profit? No other business in the country would stand the lack of intelligent work that our dairies do. I believe there is more need of intelligence in dairying than in any other line of farm work. There is no point in which there is not an equal need of intelligence, and when it comes to the point of figuring the profit or of studying to increase the profit there is more room than any other place in the whole line of agriculture. Why more dairymen do not improve these opportunities to help themselves I am at a loss to understand. No manufacturer could withstand the competition he has to contend with if he left unimproved opportunities like most dairymen are doing, in not testing their cows and knowing what each cow is doing for them. Did you ever think of the farmer as a producer, as he is in growing his crops, in which work there is use for great practical knowledge and skill. Next, as a manufacturer, as he is when he employs his farm animals to manufacture his coarse fodder and grain into milk, beef, pork, etc., and with the dairy as he manufactures as he does in some cases, his milk into butter and cheese. Next as a salesman, as he must be when he sells these products of the farm. It seems plain to me that the successful dairyman of the future must be the brightest, brainiest man of the whole list. He must be a master of details. I wish to impress upon you the comparative profit of cows that make 250 pounds of butter annually and those that make more. The 250 pound cows leave fifty pounds for profit and the 300 pound cows leave 100 pounds for profit, or twice as much as the 250 pound cows, and she is worth twice as much—yes, she is worth more than that. If properly bred she will bear calves that will make 300 pound cows or better. We certainly should weed out the cows that are getting us in debt, after which we should and would continue to weed out until we get a profitable dairy.

When I first tested my dairy the average make of butter per cow was 150 pounds, and this testing was done by setting each cow's milk by itself and skimming and churning it separate. This made much work but it paid. For the year 1895 the cows of my dairy that were four years old and over averaged 329 pounds, and the average of the entire herd was a little over 300 pounds per cow. This work must be taken hold of with a grip that allows no slipping, when it will prove not only profitable but instructive. I found cows in my dairy that would eat up the profit of another cow that made 265 pounds of butter per year. The two cows paid me nothing. When the poor one was sold the better one paid me $12 to $15 yearly.

There are thousands of such cases in the dairies of the United States. Here is a matter in which we can help ourselves. Here we can come nearer lifting ourselves by our boot straps than in any other way I can think of. We do not need to ask for legislation unless it is to compel us to improve our opportunities. Some of us need this without doubt, but we would rebel against it, of course. That is man nature—foolish man nature.

I believe it is entirely practical to secure by a few years' persistent, intelligent work a dairy that will produce an average above 300 pounds of butter yearly. After we have learned the ability of each cow for profit we are in shape to help ourselves by intelligent breeding.

Remember always that the bull is one half the herd when it comes to raising calves, and do not let a few dollars come between you and a choice animal. I breed to have the heifers drop their first calves at two years of age. I believe I secure better milch cows in this way than by waiting until they are a year older.

Unprofitable cows should be fattened while being milked. This can be done by heavy feeding, and there is less loss by so doing than any other way I have learned of.

The point that has most frequently attracted my attention is the palatability of the food. This is a key to the situation, and must be closely looked after. A satisfactory profit comes with a palatable food, and it does not come without it, for the reason that the cow will not consume enough above the food of support to make a satisfactory profit.

Most dairymen cut their hay too late, or when too much matured, to make the most palatable food and to secure the best profit from feeding cows. Hay should be made when the grass is in full blossom. I have never been able to overcome the mistake of cutting hay too late. An increase of ground feed does not accomplish it, but at the same time it adds to the cost of food in most sections of the west.

Corn for silage should be cut between the denting and glazing stage. I am confident that it then contains the most available or digestible nutriment. I like to have it as far matured as we can, and have the cows digest the whole grain in the silage, and I think there should be plenty of this grain or corn in the silage. I now plant less than one half as much seed per acre as I did ten or twelve years ago. In this way I do not secure as much food per acre of corn, but I do believe I secure more profit per acre when it is fed to cows.

I am an advocate of warming the drinking water for cows in cold weather. I have practiced it for several years. I am sure it pays. It increases the profit and decreases the risk from sickness. A cow can safely drink all the water she wants at all times when the water is at a temperature of eighty degrees Fahrenheit or above.

For many years my practice has been to have my cows drop their calves in September to December.

I think the advantages of winter dairying over summer work are not as great as they were several years ago, and still I think it advisable to have the cows fresh in the autumn months in place of the spring months. The cows will produce more milk during the year. They will give milk a longer period when they are dried off on pasture than they will when dried on winter feed. Winter dairying helps to equalize the farm work. We can keep the help all the year, and secure a better class of help by giving employment the whole year. This is a matter of no small importance.

When my cows are dried off on pasture without any grain food I have very seldom had any milk fever; but when I feed grain during the dry period I frequently have trouble from this source. Dr. Leonard Pierson, of the Philadelphia Veterinary College, warns dairymen on this point. The cows should have all they wish of a proper food at all times, but keep the grain from them when they are dry previous to parturition.

The cow stable should be kept at a temperature above freezing at all times. On this point I quote from the London *Dairy*, in which Mr. Alexander Pottie gives the results of some experimenting with temperatures of stables. He says a temperature of 63° gives the best results. He says that in one case with thirty cows the value of the milk was $15 per week more when the stable was kept at 63° than when it was kept at 52°. I have used the neck ties and stanchions, but have discarded them and am now using the Bidwell stall. In my new stable I have cement floors, gutters, and also cement mangers. I have individual stalls which have some of the Bidwell ideas, some from the Drown stall and some from my own ideas. The stall partition is entirely of iron, a No. 7 double crimped wire woven on to channel iron frames.

I have had an expensive experience with abortion in my dairy. It cost me sufficient to cause me to remember it. One year seven-twelfths of my dairy aborted. If this question interests my hearers we can (if there is time) discuss it at the close of my paper. Very few dairymen appear to realize the importance of the work of milking, the necessity for kindness, neatness, system and regularity.

I have found a difference in milkers in the matter of keeping up the flow of milk that was alarming—sufficient to pay a man's salary when he milked fifteen cows for a year. Some milkers can and will keep up the flow of milk of their cows. Others can but do not, and still others cannot when they do their best.

For two seasons I offered prizes for my milkers to compete for, and secured the best work I ever had.

There is one point to which I have given much thought during the past three years. When I started the enterprise at my farm of producing certified milk I adopted the plan of having each milker cleanse the udders of the cows he milked before he commenced milking. The cows had been tested with tuberculin previous to this.

When we commenced the certified milk work we noticed that there followed a shrinkage in the flow of milk that was a surprise to me, and I could not account for it. My first thought was that it might be a result of the tuberculin test, and I was worried about it; but after giving the matter thought, and getting information from several sources, I reached the conclusion that I must look elsewhere for the cause.

We noticed after a time that this shrinkage commenced immediately after the cows were put in the stable in which the cows were kept from which the certified milk was produced. The business commenced small, and the cows were not at first all put into this stable, but were transferred from another stable at times when needed.

This set me on another line of thought, and convinced me the cause was in the treatment of the cows in some way, and the only difference in the work between the two stables was in the milking, and I soon had the trouble corralled. About this time there was a discussion in Hoard's *Dairyman* about the bad effect of manipulating the cow's udder except immediately in advance of milking, for the reason that it stimulated the secretion of milk by the cow, and nature's effort was not assisted by relieving the cow of the milk as secreted, and the effect was a damper on nature's effort and resulted in a decrease of the flow of milk.

After due deliberation I changed of my plan of work in cleansing the udders, so that now I have a man who does nothing but cleanse the udders, and does it just in advance of the milkers. The results are now satisfactory.

Here is a wonderful field for thought and intelligent action to help nature, or, if we cannot help, prevent getting in the way while she is doing her work. When we study our own systems we can see how easy it is to work against nature and do mischief that is beyond calculation, as it has to do with human life.

Mr. LEITCH : I would like to criticize one sentence in your paper. I want the cows to come in in April. I think if you are going into butter making your ideas are all right, but if you are going into cheese making, I think it is better to have the cows come in in the spring.

Mr. GURLER : I am talking for the dairy man, I am not talking for the manufacturer. I do not care whether it is butter making or cheese, I know the cow will produce more milk to be fresh in the fall than she will produce any other way. Let the cow come in, in the spring and she commences to dry up naturally in the winter, and after the dry food she will dry up in spite of you. But let that cow come in in September, October or November, and she commences to dry up the next summer in fall pasture, and she will milk as long as she can milk. I have no trouble in getting my cows to dry up under these conditions. I thihk I am right when I am talking for the dairymen.

Mr. LEITCH : You are right from the butter-maker's view, but I would be sorry to have my factory shut up in the months of September and October.

Mr. GURLER : You would get enough milk to run your factory that time, and it would extend your work the whole year, and you would not have to close your factory at all.

Mr. LEITCH : I would advise farmers to have their cows come in, in the spring, because you make your butter cheaper from grass than you can in winter time, and for this reason I dispute that saying on account of the business we have to do here.

The CHAIRMAN : I am in a district where we are not so far advanced as Mr. Gurler's paper and methods, but I think he is perfectly right. We will have to do the best we can, and we will have to educate our people up to the point where Mr. Gurler is.

Mr. GURLER : I have been in the same situation as you are here. We have got out of that, and there was a good cause for us to get out of it. There is just as good a reason for your getting out of it, and you will get out of it. We have got to lead our patrons. In some of our creamery work, I have had sharp competition with the milk dealers. We are near Chicago, and the patrons say, "I can get more for my milk by sending it to Chicago," and that cuts into our business ; but when I introduced our Babcock test Is put men among my patrons—men who stayed there and tested the milk and figured out what each of these cows were doing for our patrons. I have done that kind of work years, and paid for it myself, and by that means I have helped the patrons to get rid of their unprofitable cows ; and that kind of work has raised the percentage of fat in one of my creameries, so that now the whole mass of milk for the past year averaged over 4.06 of fat for the entire milk that came to that creamery, and they cannot afford to send that milk to Chicago. They can get more for it by bringing it to the creamery.

A MEMBER : What breed of cows have you in your locality ?

Mr. GURLER : We have every kind mostly that you can think of. We have grade short horns and grade Holsteins and grade Jerseys. We have very little of the Ayrshire blood. My own herd is just as badly mixed as anybody's herd.

A MEMBER : Do you think September or October would be the best time for a heifer to have her first calf ?

Mr. GURLER : I think that time would be all right ; I would rather have them in the fall.

A MEMBER : Did you ascertain the cause of abortion in your cows ?

Mr. GURLER : There is a contagious disease of abortion.

A MEMBER : Before your cows aborted three or four days, did their udders seem to be making bad ?

Mr. Gurler : I never had the contagious form more than once on my farm. They dropped their calves in September or October. The trouble commenced along in July or the beginning of August. My first trouble was twelve or fourteen years ago. The New York legislature appropriated $10,000 to investigate the cause of abortion in cows, and one of the commissioners said : "I do not think I know so much about abortion as I thought I did before the investigation commenced."

Mr. Derbyshire : My friend, Mr. Leitch, need not go home and sit up all night worrying about all those farmers in his locality whose cows may come in in the fall, because it will take a lot of this kind of preaching to get all our people into the proper form of work. For twenty years we have been preaching the same kind of doctrine for better living : for keeping cows in a better way, for weeding out the unprofitable servants, and for better feeding and stables. This last year about 3,500 pounds of milk per cow is the average for Ontario. That is 500 pounds more than the average of our regular season ; so you see how slow our people are moving in this direction. I am satisfied that, after the able addresses that have been delivered at this convention, we will go home and try to improve our herds ; improve our stables, build a silo and grown corn, so as to have a cheaper food and so that we may reduce the cost of production, which is the greatest problem of the age. In every establishment that is carrying on any business, the first thing that is figured on is the cost. What is it going to cost to manufacture the article we are making ? If we have any cows that are not paying, we ought to send them over to the United States and let the "Yankees" milk them. Weed out the unprofitable cow, and let somebody else milk these cows that cannot make any money for us. If we could get all our factories to take in our milk by the Babcock test, we would get the foundation stone to work on, and everybody would be anxious to have the best kind of milk. We have no motive in our present way of taking in milk. I am glad to say that a great improvement has taken place in our stables ; yet I tell you that there are hundreds of stables in this Province that when we shut the door, it is as dark as "Egyptian darkness," except for what you can see through the cracks in the wall. These stables are not fit for animals to live in and be healthy. We must have proper cows, proper facilities for them, and proper food to give them. Do you think that with the cows you put in the stable in the fall, that have lost flesh when they come out in the spring—some of them have to be helped out of the stable—do you think you are any further ahead than you were last fall ? I think it would be better if you had a comfortable stable, and if you milked these cows in winter time, and thus have profitable work going on in the winter. If we could add from $400,000 to $800,000 to the income of our Province by this additional profit, it will be a large amount of money put in circulation, and it will do good. This year we have made 63,000 packages of butter more than we did last year, in the first six months, and I am sure we made four times the butter this year than we ever did before, and we have made more cheese, and we are going to continue the cheese business. Let us stand up and be Canadians, and let the world know that we are enterprising, and that we are going to take the first place in everything we undertake. Mr. Derbyshire then told two laughable, interesting and instructive stories which illustrated the necessity for cleanliness, tidiness and progressiveness in connection with the dairy business.

Several complimentary references were made to the good work done by the retiring President.

Mr. MacLaren : I am sure I appreciate very heartily indeed the vote of thanks you have just tendered me. I must say that I look upon the position of president of the Butter and Cheese Association of Canada as being just as honorable a one as that of member of Parliament. I do not know but that it is more so. I think the dairy business is one that the farmers should look upon as being their "Klondyke." I think it is only in its childhood's days. The farmers should take more care in selecting their cows. In many cases the poor cows are eating the profit of the good cows. If the farmers would go to work in the right way, they could get cows that would pay large profits. As far as I am concerned, in the Association or in Parliament, or out of Parliament, I will do all I can to advance the interests of this Association.

The Convention then adjourned.

APPENDIX.

LIST OF MEMBERS FOR 1898.

BUTTER AND CHEESE ASSOCIATION OF EASTERN ONTARIO.

Name.	P. O. Address.
Arnold, T.	Lindsay.
Allen, Robert	Peterborough.
Anderson, James C.	Bobcaygeon.
Anderson, William	Lakehurst.
Andress, J. P	Bailieboro'.
Arnot, Robert	Peterborough.
Ashley, H.	Belleville.
Birchard, James	Linden Valley.
Brady, John	Lindsay.
Byers, John	Powle's Corners.
Burn, J. R.	Janetville.
Balfour, R. J.	Omemee.
Braden, Andrew	Bobcaygeon.
Bretherton, Rev. Father	Downeyville.
Bevish, Archibald	Dunsford.
Bailey, Robert	Fowler's Corners.
Brady, James	Lindsay.
Bensley, G. H.	Warkworth.
Bird, Morden	Stirling.
Brown, J. A.	Reaboro'.
Balkwell, George	Lafontaine.
Bell, James A	Beaverton.
Brenton, F. W.	Belleville.
Burke, George	Reaboro'.
Bell, John	Dunsford.
Bickell, Samuel	Peterborough.
Bissell, Howard	Brockville.
Callaghan, William	Downeyville.
Clendennin, Edward	Cambray.
Cochrane, James	"
Cochrane, John	"
Christian, John	Glenarm.
Cruess, Richard	Linden Valley.
Coad, Charles	"
Cruess, William	"
Clancy, Patrick	Lindsay.
Curlin, Peter	"
Curtis, Harlen	"
Cullis, William	Powle's Corners.
Callaghan, M. J	Downeyville.
Currins, I. T.	Lindsay.
Cameron, T. J	Westwood.
Carlaw, T. B.	Warkworth.
Campbell, A.	Ormond
Campbell, A.	Lindsay.
Clemie, John S.	Montreal, Que.
Cummings, J. W.	Grafton.
Calvert, John	Reaboro'.
Cornell, David	"
Calvert, Thomas	"
Corneil, D. H	Omemee.
Corneil, William	Lindsay.
Cruess, George	Linden Valley.
Costello, Francis	Lindsay.
Crandall, W. T.	Picton.
Campbell, N. L	Lorneville.
Derbyshire, D.	Brockville.
Donald, W. A.	Hoard's Station.
Dargavel, John R.	Elgin.
Daly, P. R.	Foxboro'.
Davis, Joseph	Reaboro'.
Day, William E.	Lindsay.
Eager, William	Morrisburg.
Fowler, William	Cambray.
Fisher, Alexander	Lindsay.
Fee, T. H.	Omemee.
Fee, W. W	"
Fee, S. F	"
Ford, Robert E.	"
Fell, William	Bury's Green.
Fox, S. J	Lindsay.
Fee, W. B	"
Fiefield, I. A	Newboro'.
Fraser, Donald	Kirkfield.
Greenaway, W. J	Cambray.
Graham, John	Fenelon Falls.
Graham, William	"
Graham, Robert	"
Greenan, James	Lindsay.
Garvey, Patrick J	Downeyville.
Graham, Thomas	Omemee.
Gould, Joseph E.	Uxbridge.
Granby, Wm. J.	Mount Horeb.
Graham, R. J	Belleville.
Grant, W. N.	Woodville.
Haight, J. W.	Cambray.
Hancock, Benjamin	Linden Valley.
Hunter, John	Dunsford.
Hunter, T. M.	Burnbrae.
Howey, H	Newburgh.
Herriman, W. H	Lindsay.
Holmes, W. J.	Blackstock.
Hawkin, Peter	Reaboro'.
Holmes, A.	"
Hope, John, jr	Villiers.
Holmes, William	Kirkfield.
Ingram, Thomas J	Bobcaygeon.
Irwin, John	Cambray.
Irwin Robert	Janetville.
James, Thomas	Cambray.
Jordan, Wm	Oakwood.
Johns, Morgan	Bobcaygeon.
Jackson, John	Lindsay.
Johnston, J. H	Reaboro'.

LIST OF MEMBERS—*Continued.*

Name.	P. O. Address.
Knight, Charles	Oakwood.
Kelly, Mary	Bobcaygeon.
Kelly, Thomas	Red Rock.
Kelso, Joseph	Bobcaygeon.
Kidd, Edward	North Gower.
Kerr, J. A	Wellman's Corners.
Kelly, James	Ferguson's Falls, [Minn.
Kline, F. E	Lakefield.
Kearns, Thomas	Glenarm.
Kearns, Henry	Kirkfield.
Lytle, E. G	Cambray.
Lapp, Stanley	Linden Valley.
Lehane, W. H	Downeyville.
Lucas, Joseph	“
Lowery, J. B	Frankford.
Lapp, Bert	Lorneville.
Lithgow, James	Dunsford.
Lewis, M. J	Bobcaygeon.
Lewis & Patterson	Brockville.
Levey, John	Lindsay.
Lonsborough, W	“
Lytle, George	“
Moriarty, Michael	Lindsay
Murphy, George	“
McGee, Alexander	Fenelon Falls.
MacKay, Henry	Lindsay.
Magee, J. R	Janetville.
Malloch, John	Omemee.
Moore, I. H	Lindsay.
Murphy, R. G	Elgin.
Munroe, Wm. & Son	St. Elmo.
Minthorn, Albert E	Powle's Corners.
Moore, C. D	Peterborough.
Moore, Joseph	Reaboro'.
Metherell, Elias	Little Britain.
Moore, J. W. & Co	Peterborough.
Myers, W. H	Balsam Lake.
Moynes, Isaac	Lindsay.
McQuade, George	Omemee.
McQuade, T. H	“
McDonald, John	Lindsay.
McLeod, W. D	Kirk Hill.
McTavish, John	Vancamp.
McAmus Robt	Dunsford.
McRea., C. J	Beaverton.
McCann, T. E	Stirling.
MacGeough, B	Omemee.
Naismith, Dr	Janetville.
O'Brien, J. D	Downeyville.
O'Keefe, D	Battersea.
O'Connell, James	Lindsay.
Parkin, Samuel	Lindsay.
Paul, Thos. H	“
Parkin, Taylor	Cameron.
Powles, James	Powle's Corners.
Potter, A. J	Rossmore.
Purvis, A. P	Maxville.
Palmer, W. A	Toronto.
Philip, T. W	Precious' Corners.
Peel, John H	Lindsay.
Pollard, George H	Burnbrae.
Paul, Wm. J	Red Rock.
Patterson, Robert	Omemee.
Pague, John J	Reaboro'.
Payne, S. R	Warsaw.
Poole, Jas	Waba.
Publow, G. G	Perth.
Ritchie, Jas	Cambray.
Rogers, David	Linden Valley.
Robertson, Jas	Lindsay.
Russell, Thos	Bobcaygeon.
Reid, John R	Downeyville.
Ryan, Albert	“
Robertson	Bobcaygeon.
Robertson, Norman	“
Robertson, Thos	Dunsford.
Richardson, Richard	Lindsay.
Renwick, G. A	Cavanville.
Rogers, Henry	Enniskillen.
Robertson, Wm. M	Lindsay.
Roberts, Christopher	Burnley.
Reid, J. W	Reaboro'.
Rea, Geo	“
Rea, Weldon	“
Rea, William	“
Reid, W. T	Lindsay.
Robertson, D. A	Wellman's Corners.
Sinclair, David	Cambray.
Sinclair, Wm	“
Shire, Thos	“
Smithson, W	Glenarm.
Staples, John	Red Rock.
Saylor, Chas. S	“
Stinson, Joseph	“
Symons, Joseph	Cameron.
Syer, Thos	Janetville.
Shyne, Eugene	Downeyville.
Spellman, T. C	Omemee.
Story, Evans	Fowler's Corners.
Stillman, R. T	Blackstock.
Spence, S. S	South Dummer.
Shields, T. J	Tichborne.
Smith, John	Blackstock.
Shillinglaw	Campbellford.
Sproule, J. C	Cannington.
Sprague, Mark	Ameliasburg.
Smith, George	Reaboro'.
Spry, Wm. J	Stirling.
Scully, Dennis	Downeyville.
Stinson, David	Red Rock.
Stuckart, Mrs. Coleman	Chicago, Ill.
Staples, Frank	Balsam Lake.
Tamlin, W	Cambray.
Tompkins, W. H	“
Tamlin, Thos	“
Twohey, John	Lindsay.
Terrill, J. J	Linden Valley.
Tiers, William	Bobcaygeon.
Taylor, Wilbert	“
Thurston, William	“
Teevan, J. J	Lindsay.
Taylor, F. C	“
Tompkins, Henry	“
Tinney, J. D	Oakwood.
Thomson, Thos. H	Madoc.
Thompson, C. W	Cooper.

LIST OF MEMBERS.—*Continued.*

Name.	P. O. Address.	Name.	P. O. Address.
Tinney, Jos	Oakwood.	Wade, Henry	Toronto.
Thomas, Jas	Woodville.	Warren, William	Glenarm.
		Weir, R. J	Lang.
Webster, Frank	Cambray.	Winnie, Dan	Downeyville.
Webster, Richard	Glenarm.	Wood, D. H	Fowler's Corners.
Westaway, Richard	Cameron.	Woods, W. G	Lindsay.
Worseley, Elijah	Fenelon Falls.		
Willock, John	Powell's Corners	Yearsly, O. J. B	Little Britain.
Weir, William	Omemee.		
Wood, J. A	Fleetwood.	Zufelt, L. A	Chesterville.
Wood, C. H	Maxville.		

BUTTER AND CHEESE ASSOCIATION OF WESTERN ONTARIO.

Name.	Post Office.	Name.	Post Office.
Adams, C. F	Trowbridge.	Bowey, J. T	Leesboro'.
Agur, E	Brownsville.	Boyes, J. W	Leesboro'.
Aikenhead, John	Brucefield.	Boyes, Frank	Putnam.
Alderson, Jos	Kintore.	Boyes, Geo. A	Mapletown.
Alderson, Thos	"	Brett, Wm	Ingersoll.
Aldrich, A	Cheapside.	Brickman, Simeon	Sebringville.
Allen, Edwin S.	Box 233, Ingersoll.	Bristow, Jas	Bright.
Allen, David (jr.)	Holstein.	Brodie, John	Mapletown.
Alteman, P. W.	Straffordville.	Brodie, W. A	Glanworth.
Anderson, Alex	Fernhill.	Brodley, Chas	Farmington, Mich.
Anderson, Wm	St. Paul's Station.	Brooks, F. H	Holbrook
Anderson, Wm	Woodstock.	Brown, J. L	Lawrence Station.
Angus, W. D	Atwood.	Brown, M. R	Appin.
Anstice, C. F.	Springford.	Brown, S. P	Birnam.
Atkinson, W. J	Kintore.	Brown, W. W	Attercliffe Station.
		Brown, P. W	Winchelsea.
Bailey, Bert	Bluevale.	Brynell, A. B	Thamesford.
Ballantyne, T. J	Lambeth.	Buzzell, Nelson	Cowansville.
Ballantyne, Thos., jr	Stratford.	Burgess, Jas	Bluevale.
Ballantyne, R. M	"	Byerlay, W. H	Courtland.
Barr, G. H.	Sebringville.		
Barr, Robt	Ethel.	Campbell, A	Stratford.
Barr, Wm	Putnam.	Carns, Lewis	Straffordville.
Barry, T. D.	Ingersoll.	Carmichael, Jas	Arva.
Barwick, Rich	Winthrop.	Callan, Peter	Innerkip.
Backet, Miss Sara	Fanshaw.	Calder, A. G	Clarksburg.
Bayne, W	Newbury.	Campbell, Alex	Aberdour.
Balkwill, Geo	Lafontaine.	Cameron, W	Courtland.
Bell, A T	Tavistock.	Caddy, Thos	Ingersoll.
Bell, J. C	Winchelsea.	Campbell, F. A	Mitchell.
Bertrand, C. A.	Courtwright.	Campbell, A. W	Toronto.
Biffin, A. J	Charlottet'n, P.E.I.	Capon, Herbert	Cairngorm.
Biffin, Jas	Innerkip.	Carey, W H	Croswell, Mich.
Blackmore, J. G	Drumbo.	Carter, F	Walkerton.
Blaney, John	Lynnville.	Carter, J. G	"
Bobier, Joshua	Ingersoll.	Carter, Edward	"
Bobier, A. Q	Exeter.	Chalmers, D	Poole.
Bond, Byron	York, Ont.	Chalmers, Alex	Monkton.
Bonesor, Jas	Bayham.	Charlton, Jos	Lynedoch.
Bongard, W. L.	Crampton.	Chandler, J. H	Dutton
Booth, Geo. E	Ingersoll.	Chowen, R	Thamesford.
Borland, John	Verschoyle.	Chummings, Robt	Centralia.
Bothwell, W. A	Hickson.	Clarke, A. F	Stratford.

List of Members.—*Continued.*

Name.	Post Office.
Cleland, Jas	Listowel.
Clarke, J. S	Warwick.
Clarke, Albert	Mt. Elgin.
Copeland, John	Harriston.
Cousins, Geo	New Hamburg.
Coleman, E. C	Seaforth
Cornell, Wm	Straffordville.
Cooke, A.	Cotswold.
Connelly, E	Newbury.
Conolly, B. J	Ingersoll.
Connolly, Jas	Alsfeldt.
Cohoe, H. G	New Durham.
Cohoe, E. L	Humberstone.
Corless, J. G	Burgessville.
Crew Bros	Wheatley.
Creighton, W. S	Liverpool, Eng.
Cranston, W. R	Strathroy.
Cranston, R. R.	West Magdala.
Cuckow, Osborne	Kelvin.
Cuddy, Robt	Woodstock.
Cuthbertson, J	Wellburn.
Darrock, Arthur, W	Harriston.
Dalton, W. H	Crumlin.
Derbyshire, Dan	Brockville.
Delbridge, John	Winchelsea.
DeLong, G. V	Woodstock.
Dean, Fred	St. Mary's.
Dempsey, D. A	Stratford.
Delbridge, Rich	Winchelsea.
Donwham, Peter	Woodstock.
Donley, Geo	Gladstone.
Doan, Jos	New Sarum.
Doan, Duncan	Mapleton.
Donnolly, J. T	Talbotville.
Dunn, Wm. L	Clear Creek.
Duncan. L. A	Forest.
Duncan. Milton	Oil City.
Eagle, Harold	Attercliffe Station.
Easton, M	New Sarum.
Eccles, John	Norwich.
Edwards, W. H	Nilestown.
Edward, John	Kintore.
Ellis, A. D	Simcoe.
Elliott, Jas	Tilsonburg.
Elliott, A. F	Bluevale.
Evans, J. H	Tiverton.
Everett, C. H	Sebringville.
Evans, John	Belmont.
Evison, Albert	Poplar Hill.
Facey, E	Harrietsville.
Farrington, J. L	Norwich.
Fearman, Jas	York.
Ferris, Thos	Ingersoll.
Fisher, J. J	Stratford.
Feirheller, A. R	Mt. Elgin.
Fitzpatrick, —	Belmont.
Flots, D. C	St. George.
Ford, E. G	Lynn Valley.
Fowler, Malcolm	London West.
Foster, W. B	Holmesville.
Frier, Wm	South Cayuga.
Fraser, Donald	London.
Frain, Arthur	Holbrook.
Ford, J. J	Dorchester Station.

Name.	Post Office.
Galloway, W. J	Adelaide.
Geary, John	London.
Gickling, Thos	Listowel.
Gibson, R. T	Avonbank.
Gilmour, John	Nilestown.
Ginther, Ezra	Winger.
Gordier, E	Muirkirk.
Goodhand, G	Milverton.
Gott, L. A	Strathroy.
Gray, Jas. A	Listowel.
Green, R. H	Brussels.
Gray, W. W	Stratford.
Gracey, A. E	Trafalgar.
Griffith, A.	Thorndale.
Gray, Geo. R	Lynedoch.
Green, Thos	Wyandotte.
Gray, Neil	Braemar.
Gray, Jas	Banner.
Grieve, J. S	Zenda.
Grandy, Stephen	Brownsville.
Gurley, B.	London.
Gray, Albert W	Sharon, Wis.
Harrison, H. W	Strathroy.
Harris, W. W	Brussells.
Harris, A. M	Lakeview.
Hadcock, A. E	Mt. Elgin.
Henderson, J. T	Pine River.
Hepburn, W. F	Union.
Hepburn, Mrs. W. F	"
Hicks, Wm	Dutton.
Hibbard, W. P	Stratford.
Hill, Geo. W	Summerhill.
Hinds, W. W	Wardsville.
Hill, Wm. A	St. Thomas.
Hotson, J. L	Avonbank.
Hopkins, E. M	Moosejaw, N.W.T.
Holland, P. A	Walton.
Howard, Wm	Camilla.
Howard, J. C. C	"
Hood, Wm	St. George.
Hope, Wm	Palermo.
Hoover, Edwin	Selkirk.
Hopkins, E	Thorndale.
Hunter, Samuel	Rockton.
Hunter, E	Woodstock.
Humphrey, T. J	Birr.
Hunter, J. J	Cainsville.
Hyland, A. G	O. A. C., Guelph.
Isard, J. S	Paisley.
Immel, —	Mildmay.
Irving, Norman	Smithville.
Isaacs, John R	London.
Ireland, Ernest	Newcastle, N.S.W.
James, Jas. A.	Nilestown.
Jacob, Gideon	Sebringville.
Jackson, Lizzie	Petrolea.
Jamieson, Alex	Thedford.
Jackson, Wm	Belmont.
Jardine, Robt	Albarder.
Jenkins, Chas	Thamesford.
Johnson, Robt	Bright.
Johnson, Ed	Holmesville.
Johnson, J. S	Evelyn.
Johnson, E. D	Tilsonburg
Johnson, J. S	Evelyn.

LIST OF MEMBERS.—*Continued.*

Name.	Post Office.
Karn, Jas	Embro.
Kennedy, Geo	Kingsmill.
Keillor, A	Wallacetown.
Kent, Wesley	Woodstock.
Kinney, Geo	Snelgrove.
Kidd, Martin	Aylmer.
Kingsmille, T	London.
Kinnell, Louis	Guelph.
Kitchen, S. G	St. George.
Knecthel, Moses	Tavistock.
Kneal, W. H	Holbrook.
Kingsbury, Ed	Arkell.
Laird, S. W	Ingersoll.
Lachapelle, Austin	Culloden.
Lander, Chas	Mitchell.
Lee, J. W	Simcoe.
Leach, Z. A	Lucknow.
Leak, F. A	Blytheswood.
Leitch, A. W	Trowbridge.
Leis, W. S	Wellesley.
Leitch, Dougald	Roome.
Lipsit, J. B	Straffordville.
Lister, C. E	Chatham.
Lochead, Geo	Atwood.
Lockyer, E. A	New Durham.
Lockhead, Wm	Atwood.
Lotan, Jos	Appin.
Loughin, W. C	Thamesford.
Logan R. W	Goderich.
Luton, C. O	Lyons.
Lutes, W	Bothwell.
Mayo, Geo	Sebringville.
Malcolm, John	Sheffield.
MacHoover, J	Springfield.
Mallory, J. C	Yarmouth Centre.
Marshall, G. B	Tiverton.
Maines, D. W	Millverton.
Mann, H. A	Ingersoll.
McTaggart, Geo	Arkona.
McAllum, Angus	Avon.
McAlpine, John	Lindsay.
McFarlane, Albert	Brucefield.
McIntyre, D. A	Strathroy.
McKellar, John	Belmont.
McAllister, A	Crosswell (Mich.)
McKenzie, Geo. A	Ingersoll.
McAllum, Alex	Kerwood.
McKay, Alex	Brooksdale.
McKellar, G. M	Blyth.
McBeth, S	Stayner.
McArthur, Robt	Tilsonburg.
McKenzie, Alex	Donegal.
McKraith, J. H	Bookton.
Mckie, Geo	Norwich.
McMillan, D	Poole,
McCully, W. J	Sebringville.
McDermott, A	Ridgetown.
McKellar, D. A	White Oak.
McIntosh, R. A	Wisbeach.
McDonald, Geo	Bluevale.
McEwan, Arthur	Sebringville.
McRoberts, D. H	Milverton.
McEwan, F. S	Verschoyle.
McMillan, D	Thamesford.
McNabb, D. B	Woodstock.
McKee, Geo	Harrietsville.
McKenzie, Jas	Putunam.
MacLaren, A. F	Stratford.
Meighen, Jos	St. Marys.
Messer, W	Bluevale.
Miller, E	Parkhill.
Millar, T. B	Kincardine.
Mills, Geo	Thamesford.
Millar, Arthur	Donegal.
Millson, Frank	Winthrop.
Miller, F	St. George.
Miners, C. G	Tilsonburg.
Morrison, Jas	Stratford.
Morris, Wm	Avon.
Moore, M	Windsor.
Morrison, Miss Aggie	Newry.
Morrison, Miss Mary	Newry.
Morrison, E	Straffordville.
Morrison, Jas. I	Woodstock.
Morrison, A. A	Fullartons' Corners.
Morrison, M	Harriston.
Monck, J. A	Putnam.
Munn, D. C	Windham Centre.
Muir, J. B	Ingersoll.
Murray, John R	Avonton.
Murray, Robt. A	Ethel.
Myrick, R	Springford.
McKechenie, W. G. & J	Durham.
McEwen, Jas. L	Verschoyle.
McKee, Wm	Harrietsville.
Nimmo, T. E	Royal Oak.
Nancekeville Wm	Ingersoll.
Newcombe, W	Britton.
Nicholls, E	Burgessville.
Oldham, Wm	Dresden.
Olliver, Walter T	Arva.
Ormerod, Wm	Napier.
Ostrander, W. A	Dutton.
Oliver, Robt	South Cayuga.
O'Flynn, J. J	Kinkora.
O'Flynn, J	Tavistock.
Paterson, J. G	Molesworth.
Palmer, W. J	Toronto.
Parker, Robt. A	Woodstock.
Parker, Wm. L	Woodstock.
Papineau, P C	Kintore.
Patterson, F	Thamesford.
Paterson, Jas	New Durham.
Pack, A	London.
Pack, Wm	Innerkip.
Pedden, Wm. A	Woodstock.
Perkins, J. W	London.
Pelton, J. G	Innerkip.
Peters, Oliver	Stratford.
Pettypiece, W. M	St. Marys.
Pearce, J. S	London.
Pearce, Leslie H	Tyrconnel.
Philps, A. L	Mapleton.
Phelps, L. L	Dereham Centre.
Platt, John	Wenn, Salop, Eng.
Pow, John	Vittoria.
Pollard, Albert	Tilsonburg.
Pow, H	Walsh.
Pow, Wm	Mt. Elgin.

List of Members.—*Concluded.*

Name.	Post Office.	Name.	Post Office.
Pomeroy, Wm	Fullarton.	Stokes, W. S	Conn.
Prain, John	Harriston.	Stratten, R. W.	O.A.C., Guelph.
Price, W. W	St. Marys.	Stevenson, S. K	Camlachie.
Proudlove, Johnson	Simcoe.	Stacey, John E	Mitchell.
Pyke, H. R	Dunbar.	Stacey, W. P.	Fullerton.
Procunior, M	Nilestown.	Stonehouse, J	St. Marys.
		Stacey, Thos	Fullarton.
Ransford, John	Clinton.	Stone, G	Courtland.
Raymond, Geo	Ingersoll.	Steele, John	Muirkirk.
Ralph, Geo, L	Dorchester Sta.	Steinhoff, I. W	Stratford.
Revell, C. A	Devizes.	Stevely, Sam	London.
Richardson, L. R.	Strathroy.	Swartz, W	Aylmer.
Raich, F. C	Newry.	Switzer, R. J	St. Marys.
Richardson & Webster	St. Marys.	Symington, I. W	Camlachie.
Richardson, D	Watford.	Sleightholm F. J	Strathroy.
Rice, Frank	Sweabourg.	Smith, Levi	Ingersoll.
Riley, C. W	Ingersoll.	Sifton, Wm	Cairngorm.
Richardson, J. B	St. Marys.		
Rollings, Geo	Charlotteville Cen.	Taylor, Arthur	Stratford.
Robb, N. L.	Poole.	Thomson, J. L	Hawkesville.
Rowe, Edgar	Bornholm.	Thomson, W. B	Nile.
Robertson, Robt	Winnipeg, Man.	Thomas, R. A	Barrie.
Ross, Hugh	Embro.	Thornton, H. N	Culloden.
Robson, W	Campbell's Cros'ng.	Thompson, R	Eastwood.
Rollins, V	Lucan.	Thomson, F. A	Bennington.
Ross, Jas	Ilderton.	Tindall, A. E	Monkton.
Rusling, John	Boston.	Torrance, Thos	Fenelon Falls.
		Travis, C. C	Eden.
Schrug, C	New Hamburg.	Travis, Geo	Courtland.
Scott, J. H	Harrietsville.	Tuttle, G. A	Mapleton.
Scott, J. W	Sparta.	Thair, P. H	Holstein.
Schweitzer, Oscar	Chesterfield,	Thompson, John	Corbett.
Scott, Duncan	Tavistock.		
Secord, W	Putnam.	Vancamp, G	Belgrave.
Sharp, A. W	Mt. Forest.	Vankleeck, J	Listowel.
Sheardown, Wm C	Lakeside.	Vance, S. D	East Concord, N.Y.
Shapland, Albert	Fingal.		
Shrumm, Alfred	Bismark.	Walker, George	Dresden.
Sheppard, John	Bothwell.	Walter, R. J	Warwick.
Shearer, W. R	Villa Nova.	Waters, Wm	Drumbo.
Shearer, Wm	Bright.	Warwick, And	Wingham.
Simister, Robt	Ingersoll.	Waddell, Wm	Strathroy.
Sinclair, Jas	Hemlock.	Watts, R. J	Gladstone.
Smith & Russell	Alton.	Ward, O. A	Springfield.
Smith, A. D	Tilsonburg.	Wenger, A	Ayton.
Smuck, J. P	Tupperville.	Weicker, August	Tavistock.
Smith, Wm	Stratford.	White, Harry	Stratford.
Smith, R. M	Beachville.	Wheaton, J. W	Toronto.
Smith, Archie	Huntingdon (Que.)	Winders, Wm. N	Springfield.
Smith, S. A	Dorchester Sta.	Wilson, Hugh E	Arkona.
Smith, Harry	Strathroy.	Wilson, Frank	Britton.
Snyder, W. A	Culloden.	Wilson, H. K	Linden.
Snyder, Elias	Burgessville.	Wilkinson, J. H	Verschoyle.
Snyder, Lewis, H	Crosshill.	Wilford, John	Belton.
Soper, Wm	Clear Creek.	Winter, Willard	Napier.
Soper, Chas	Guysboro.	Wood, Geo. R	St. Marys.
Sovereign, C. L	Windham Centre.	Wood, A. R	Avonton.
Southwick, H. A	Avonton.	Wood, W. B	Bryanston.
Southworth, Thos	Toronto.	Walker, J. D	Staffa.
Spencer, H. W	Straffordville.	Widmeyer, Otto	Fergus
Spillett, R. E	Charlottet'n, P.E.I.		
Sprague, Mark	Ameliasburg.	Young, W. G	Fillmore, N.Y.
Splatt, Francis	Dunnville.	Young, M. M	East Aurora, N.Y.
Stevens, H. B	Lambeth.	Young, J. E	Strathroy.
Struthers, Jas	Owen Sound.	York, Harry	Harriettsville.

BUTTER AND CHEESE ASSOCIATION OF EASTERN ONTARIO

OFFICERS FOR 1898.

President	D. Derbyshire, Brockville.
1st Vice-President	E. J. Madden, (Obit.)
2nd Vice-President	John McTavish, Vancamp.
3rd Vice-President	Alpin Campbell, Ormond.
Secretary	R. G. Murphy, Elgin.
Treasurer	P. R. Daly, Foxboro'.
Directors :	
Division No 1	Edward Kidd, North Gower.
Division No. 2	Wm. Eager, Morrisburg.
Division No. 3	John R. Dargavel, Elgin.
Division No. 4	James Whitton, Wellman's Corners.
Division No. 5	T. B. Carlaw, Warkworth.
Division No. 6	Henry Wade, Toronto.
Auditors	Morden Bird, Stirling. F. W. Brenton, Belleville.
Cheese Instructors	G. G. Publow, Kingston. A. P. Purvis, Maxville. L. A. Zufelt, Kingston. G. H. Bensley, Warkworth. J. B. Lowery,, Frankfort. H. Howey, Newburg. J. A. Kerr, Wellman's Corners.
Butter Instructor	Mark Sprague, Ameliasburg.

BUTTER AND CHEESE ASSOCIATION OF WESTERN ONTARIO.

OFFICERS FOR 1898.

Honorary President	Hon. Thos. Ballantyne, Stratford.
President	Harold Eagle, Attercliffe Station.
1st Vice-President	R. M. Ballantyne, Stratford.
2nd Vice-President	Aaron Wenger, Ayton.
3rd Vice-President	James Connolly, Porter Hill.
Secretary-Treasurer	George Hately, Brantford.
Directors:	
Division No. 7	John Prain, Harriston.
Division No. 8	J. N. Paget, Canboro'.
Division No. 9	A. Pattullo, M.P.P., Woodstock.
Division No. 10	Geo. Barr, Sebringville.
Division No. 11	Alex. McLaren, M.P., Stratford.
Division No. 12	J. A. James, Nilestown.
Division No. 13	Robt. Johnston, Bright.
Auditors	J. A. Nelles, London. J. C. Hegler, Ingersoll.
Representative to Industrial Exhibition	Harold Eagle.
Representatives to Western Fair	J. S. Pearce, and Robt. Robertson, London.
Representatives to Fat Stock Show	R. M. Ballantyne and J. N. Paget.
Cheese Instructors	T. B. Millar, Kincardine. James Morrison, Stratford. Alex. F. Clarke, Stratford.
Butter Instructor	Mark Sprague, Ameliasburg.

FINANCIAL STATEMENTS.

BUTTER AND CHEESE ASSOCIATION OF EASTERN ONTARIO.

Receipts.

To cash on hand from last audit	$1,203 33
" membership fees	148 00
" legislative grant	3,250 00
" advertisements	252 00
" prosecutions	1,734 35
" factory fees from inspectors	2,677 75
Total	$9,265 43

Expenditures.

By expenses convention and regular meeting	$568 00
" reporter	80 00
" printing	229 81
" Advisory Board meeting, Toronto	122 00
" Local Committee meeting, Belleville	24 90
" directors' meeting, Kingston	131 00
" delegates to Guelph	80 00
" committee attending sundry Cheese Boards	143 29
" Local Committee meeting, Brockville	23 20
" postage and telegraphing	9 00
" one monograph	20 00
" grant to Industrial Fair and Fat Stock Show	100 00
" officers' salaries	180 00
" Board meeting, Toronto	220 00
" Dr. Connell, Kingston	11 00
" inspectors' salaries and expenses :	
G. G. Publow	992 00
A. Purvis	986 50
L. A. Zufelt	788 70
J. A. Kerr	745 00
J. B. Lowry	800 00
H. Howey	790 00
G. Bensley	775 00
M. Sprague	510 95
By balance on hand	935 08
Total	$9,265 43

We, the undersigned, hereby certify that we have examined the account and vouchers of P. R. Daly, Esq., treasurer Butter and Cheese Association of Eastern Ontario, and find them correct in accordance with the above statement.

Morden Bird
F. W. Brenton, } Auditors.

Lindsay, Jan. 13, 1898.

BUTTER AND CHEESE ASSOCIATION OF WESTERN ONTARIO.

Receipts.

Cash balance from 1896	$119 30
Members' fees	177 50
Legislative grant	3,250 00
Prosecutions	49 44
Borrowed on notes	1,000 00
Advertisements in programme *re* convention	165 00
Instructors' fees	1,010 00
Travelling expenses collected	5 75
Law costs collected	54 39
Total	$5,831 38

Disbursements.

Grants to fairs	$150 00
Expenses of conventions	501 90
Cost of reporting	92 00
Officers' salaries for 1897	492 00
" " (arrears for 1896)	80 50
Directors' fees and expenses	254 05
Postage and stationery	32 21
Printing	23 25
Advertising	28 75
Inspectors' salaries and expenses:	
J. B. Muir (arrears for 1896)	200 00
T. B. Millar, salary $980.40, expenses $302.54	1,282 94
James Morrison, salary $355.10, expenses $229.40	584 50
A. F. Clarke, salary $560.50, expenses $217.50	778 00
Mark Sprague, salary $183.25, expenses $151.75	335 00
Paid on note	500 00
Interest and bank exchange	15 95
Travelling expenses	67 75
Office expenses	49 39
Freight	1 96
Instructors' supplies	13 75
Law charges	70 00
Total	$5,553 90
Balance on hand	$277 48

Liabilities (on December 31, 1897.)

Balance due the instructors' on salary account; Millar, $19.60; Morrison, $477.90; Clarke, $356.50; Sprague, $216.75	$1,070 75
Loan	500 00
Grant to Industrial Fair	75 00
Total	$1,645 75

ADVISORY BOARD

OF THE

BUTTER AND CHEESE ASSOCIATIONS OF ONTARIO.

To the Honorable the Minister of Agriculture:

SIR,—I have the honor to submit herewith the report of the "Advisory Board" of the Butter and Cheese Associations of Eastern and Western Ontario:

Believing that the success of the dairy interests of Ontario, which have already attained to a high state of perfection, can only be maintained by watchful energy and untiring zeal, the suggestions offered by yourself as to the propriety of forming an "Advisory Board" composed of representatives from both Associations, were considered by a joint representation and action taken thereon. Officers were appointed, a list of whom is hereto appended.

Since the formation of this Board its duties have not been onerous, but several matters of importance have been laid before it, in which the dairymen of the whole Province have been interested, and recommendations and suggestions have been offered, particularly in matters of legislation, such as the "Branding Bill" and "Cold Storage Facilities," etc., which have been acted upon and the usefulness of the Board has thus been exemplified.

By its formation a channel has thus been formed through which the wants of the dairymen can be ascertained, but it also is a medium through which either of the two great Butter and Cheese Associations of Ontario can individually or conjointly urge the Governments of the day for legislation in their interests, as well as ask aid and co-operation.

Every reader of the reports of these two Associations must admit that the dairy interests of this Province, which have been so generously aided by you in the past, are of sufficient importance to demand our careful attention and watchfulness, and to warrant us in asking you for a continuation of your kind favors by way of grants to those Associations, which we believe will be expended in the best interest of the dairymen of this Province.

The following are the officers comprising the Board:—

President	D. DERBYSHIRE	Brockville.
Vice-President	A. F. MCLAREN, M.P.	Stratford.
Secretary (Provisional)	R. G. MURPHY	Elgin.

Directors:

HENRY WADE	Toronto.
T. B. CARLAW	Warkworth.
ROBERT BALLANTYNE	Stratford.
JOHN S. PEARCE	London.
AARON WENGER	Ayton.

All of which is respectfully submitted.

R. G. MURPHY,
Provisional Secretary.

ELGIN, April 20th, 1898.

ANNUAL REPORTS

OF THE

LIVE STOCK ASSOCIATIONS

OF THE

PROVINCE OF ONTARIO

1897-8.

DOMINION CATTLE BREEDERS' ASSOCIATION.
DOMINION SHEEP BREEDERS' ASSOCIATION.
DOMINION SWINE BREEDERS' ASSOCIATION.
DOMINION SHORTHORN BREEDERS' ASSOCIATION.
DOMINION AYRSHIRE BREEDERS' ASSOCIATION.
HEREFORD BREEDERS' ASSOCIATION.
HACKNEY HORSE SOCIETY.
CLYDESDALE HORSE BREEDERS' ASSOCIATION.
SHIRE HORSE BREEDERS' ASSOCIATION.
CANADIAN HORSE BREEDERS' ASSOCIATION.

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TORONTO:
WARWICK BRO'S & RUTTER, PRINTERS, ETC., ETC., 68 AND 70 FRONT STREET WEST.
1898.

CONTENTS.

DOMINION CATTLE BREEDERS' ASSOCIATION.

President's Address : John I. Hobson 3
Tuberculosis in Cattle : D. McCrae 6
Financial Statement 8
Inter-provincial Trade in Pure-bred Cattle : J. I. Hobson 8

DOMINION SHEEP BREEDERS' ASSOCIATION.

President's Address : James Tolton 11
List of Expert Judges 12
Protest at Western Fair, 1897 14
The Requirements of the Home and Foreign Mutton and Wool Markets : M. Levering 16
Financial Statement 18

DOMINION SWINE BREEDERS' ASSOCIATION.

President's Address : J. E. Brethour 19
List of Expert Judges 20
Financial Statement 21

OFFICERS FOR 1898.

Dominion Cattle Breeders' Association 22
Dominion Sheep Breeders' Association 23
Dominion Swine Breeders' Association 24

APPENDIX I.

Directors' Meeting of the Cattle Sheep and Swine Breeders' Associations—

Report of the Secretary 25
The Provincial Winter Show 81
The Address of Welcome : Mayor Elliott 35
Addresses by President Hobson, T. H. Preston, Hon. John Dryden, Hon. Sydney Fisher, and Mortimer Levering 36-44
Reception by Brantford Board of Trade 43

APPENDIX II.

The Provincial Fat Stock and Dairy Show—

Officers and Committees for 1898 45
Report of Provincial Fat Stock and Dairy Show : Richard Gibson 46
List of Prize Winners 57

APPENDIX III.

List of Members for 1897-8—

The Dominion Cattle Breeders' Association 71
The Dominion Sheep Breeders' Association 73
The Dominion Swine Breeders' Association 75

DOMINION SHORTHORN BREEDERS' ASSOCIATION.

Officers for 1898 82

List of Members 83

Directors' Meeting—

Report of the Secretary and Executive Committee 89

The Annual Meeting 95

Shorthorn Prospects: Richard Gibson 98

Broad Minded Breeders: William Linton 99

Beef Breeds and Their Value: J. I. Hobson 100

DOMINION AYRSHIRE BREEDERS' ASSOCIATION.

List of Members for 1898 104

Annual Meeting 105

Report of the Secretary-Treasurer 105

Discussion on Amalgamation 107

Care and Application of Manure: Joseph Yuill 109

The Ayrshire and Its Uses: J. C. Smith 111

HEREFORD BREEDERS' ASSOCIATION.

Report of the Secretary-Treasurer 112

HACKNEY HORSE SOCIETY.

Annual Meeting 113

Report of the Secretary-Treasurer 113

Hackneys at the Toronto Industrial Exhibition 113

Correspondence 115

CLYDESDALE HORSE BREEDERS' ASSOCIATION.

Annual Meeting 119

President's Address: Robert Davies 120

Report of the Secretary-Treasurer 120

Clydesdales at the Toronto Industrial Exhibition 122

SHIRE HORSE BREEDERS' ASSOCIATION.

Annual Meeting ....

President's Address: H. N. Crossley 125

Report of the Secretary-Treasurer 126

Shires at the Toronto Industrial Exhibition 127

CANADIAN HORSE BREEDERS' ASSOCIATION.

Officers and Committees for 1898 129

Annual Meeting 131

Report of the Secretary-Treasurer 131

President's Address 132

Fourth Annual Canadian Horse Show 134

Prize List 135

ANNUAL REPORT

OF TH

LIVE STOCK BREEDERS' ASSOCIATIONS.

1897-98.

To the Honorable the Minister of Agriculture :

I have the honor to submit herewith the Annual Reports of the Dominion Cattle, Sheep, and Swine Breeders' Associations.

Your obedient servant,

F. W. HODSON,
Secretary.

THIRD ANNUAL REPORT

OF THE

DOMINION CATTLE BREEDERS' ASSOCIATION.

The annual meeting of the Dominion Cattle Breeders' Association was held in the Grand Trunk Reading Room, Brantford, on the evening of December 6th, 1897, the President, Mr. John I. Hobson, in the chair. The President delivered the following address :

THE ANNUAL ADDRESS OF THE PRESIDENT.

The members of the Dominion Cattle Breeders' Association have much reason to congratulate themselves on the favorable conditions under which we now meet. For a number of years past the business of farming has been anything but prosperous, and it required men of a very sanguine temperament to see any bright lining in the dark clouds which pressed heavily on the farmer. At last those clouds have lifted and the business of the country shows a more healthy state. The higher price of wheat is apparently having a noticeable influence on many of the other products of the farm. Already the improved condition of farming is being felt in every city and town in the country. Business men are more hopeful, manufacturers are busy everywhere, and in many cases are crowded with orders and working overtime. Speaking, however, more directly of those interests which it is hoped will be benefitted by the work done by this Association, we find that the total shipment of cheese from Montreal up to the present time is very much greater than for the corresponding period of last year and at exceedingly satisfactory prices. What that means to the dairy farmer and the country generally can be realized when it is stated that it is estimated by those competent to speak on the matter, that from twelve to thirteen million dollars will be received this year for cheese exported. In butter also, an unusually large and profitable business has been done, the increase in the exports being greatly in excess of the corresponding periods of last year, while the prices obtained in the latter part of the season at least, leaves a good margin for profit.

Looking at the business done directly in cattle, and glancing for a moment at what has been going on in Manitoba and the Western Territories of Canada, we see that business has been very profitable to the farmer and the ranchman, and causes them with good reason to be very hopeful for the future. The possibilities of the future of that country appear to be very great. There is now an absolute certainty that there are great mineral deposits in British Columbia, North Western Ontario and the Klondike, the development of which will certainly go on at an ever increasing rate for some years to come. Besides the vast number of men engaged in mining there will be the great work of railroad construction. Considering that these men will not only be non-producers of food products but on the contrary will be large consumers, it will be readily seen that it is not too much to expect that there will be a large western demand for live stock and its products. When out west this summer I was told by some of the large ranchmen that prices had at that time gone up $5 a head for cattle, and I was farther informed that Pat Burns, of Nelson, had contracted to have delivered to him one thousand cattle a month for twelve months. That the mines of this western country will add largely to our national wealth, goes without saying, but it will not be in the value of the minerals taken from these mines which alone constitute the increased wealth, but the impetus which it will give to farming and stock raising in that great western land will be of still greater value, and will be an important factor towards the more rapid settlement of the rich lands of Manitoba, and particularly that splendid section of country so peculiarly adapted to stock raising and mixed farming, familiarly known as the Red Deer and Edmonton country. While speaking of this western country we may for a moment refer to what has been done through the instrumentality of this Association in the matter of obtaining greatly reduced rates for shipping all sorts of pedigreed stock to Manitoba and the Territories. It is not too much to say that the good work done by the Cattle Breeders Association in this direction alone, is of more real money value to the country than the whole cost of carrying on the work from the day of its inauguration until the present time. It has given an impetus to the business of breeding good stock in the east; it has given us a market for all our surplus, and what is of still greater importance, the distribution of so much good stock will raise the average quality of the stock throughout all that vast section of country from Winnipeg to the Rocky Mountains. There are yet some minor matters of detail to be attended to in this transport business which came under my notice last summer while in that part of the country, and which I purpose bringing before the executive of the Association.

While in Britain during part of the summer and fall of this year, I made it my special business to enquire into the working of live stock and dressed meat trade between Canada and that country. I enquired into it in a general way in Liverpool and Glasgow, but more particularly in London. In the latter city where I spent nearly three weeks, I had letters of introduction to Mr. Philcox, Superintendent of Deptford Live Cattle Market, Mr. Cooper, chairman of the meat trade section of the London Chamber of Commerce, also chairman of the meat markets' association of the great central meat market, as well as to Mr. Pridlen, the proprietor and manager of seven large retail establishments, and others. From the information received in this way, and a pretty thorough looking into the business generally, the following deductions may be safely drawn: That there is no feeling whatever against Canadian meat simply because it is Canadian. It is a question of quality and the keeping up of a regular supply. It was the same story everywhere, that no better meat goes into the British market than the best Canadian. I was told that by the great dealers of London, and by the prominent men in the business in the larger cities of England and Scotland. We may depend upon it if we hope to build up and maintain a large and profitable meat trade with Great Britain that it can only be done by sending the very best. We do not want to do such a business as has been done during the season now just closed, when in summarizing the transactions it is estimated that between half and three-quarters of a million dollars have been lost by the dealers who have operated from this side. The same complaint is heard in all the great markets—a superabundance of poor and middling stuff. Englishmen must have the best. Even on the comparatively small quantity of really high quality meat which goes from this country we do not realize what we would do if the supply was more uniform. As we are told on every hand by the dealers, there is no use in going into the selling of Canadian beef unless the supply of meat is kept up uniformly good, for no sooner is the taste of their customers educated up to using it than all at once the supply may run short and a lot of rough stuff be put on the market. It would appear that no other outside country has a better opportunity of taking a large share of the British trade than Canada, and if we do not secure it and hold it we have ourselves to blame. Before we can make the most of the British markets for our beef, I am inclined to think that we will have to go more into the business of slaughtering on this side and sending home in cold storage. If a supply sufficient could be had to warrant the starting of such an industry on a large scale, then we would be enabled to do as the Americans are doing, that is, utilize the inferior meats at home. It may here be said that the dealers prefer cold storage meat to the fresh killed meat from Liverpool and Deptford. As an illustration of the difference in values. On the 16th of October of this year fore-quarters were selling in the Farringdon Street market at 3d per pound or 2s per stone, and the hindquarters at 5½d or 3s 8d per stone. In the summer months suet is often not worth more than 1½d or 2d per pound, while in winter it not infrequently runs to twice that figure. As it strikes me the matter is largely in the hands of the breeders and feeders of this country. The Minister of Agriculture for the Dominion has shown himself fully alive to the importance of having a suitable system of cold storage on our railway and steamship service. In carrying out this work he has been ably supported and assisted by Prof. Robertson, a man of great ability and one who has given his best efforts towards advancing trade between the Dominion and the Mother Country. Our own Minister of Agriculture for Ontario, one of the foremost agriculturists and breeders not only in the Dominion but on the continent, a man thoroughly conversant with our wants has thrown himself with energy into the work of advancing our stock interests, and in doing so has kept prominently before the government of this Province the importance of working along those lines which would develop our trade with foreign countries. In this connection we may well ask ourselves the question, are we not too much given to depend upon governments and legislation for removing difficulties and advancing interests which often can only be done by persistent individual effort. There is something, however, which governments and legislation can do, but whether it is wise or in the interests of stock raising and the country generally that it should be done is a question upon which there is plenty of room for difference of opinion. I refer to those practically prohibitive measures which prevent our breeders from importing cattle and infusing fresh blood into their herds. No better illustration of what is going on in this direction can be given than to take the record of the transactions in Great Britain for the three months ending on June 30th of this year. During that period over two hundred Shorthorns were exported, and out of this number not a single animal came to Canada, but one hundred and ninety-five went to South America, a country which in the near future is going to be one of Canada's greatest competitors in the great consuming markets. We may well ask the question, what are we to do. We have men here who in the past have invested hundreds of thousands of dollars in importing the best stock that Britain could produce and who are ready and anxious to do it again, men who by their enterprise and skill have been instrumental in adding millions of dollars to the material wealth of the land, men who have done much to make Canada favorably known through their successful competition in many an international contest in the great cities across the line. As matters now stand these men and others are comparatively powerless to carry on the good work. Cattle may be bought in counties of England or Scotland where there is a clean bill of health ; the necessary tests may have been made by the most reliable veterinaries of that country showing a perfect freedom from disease ; all that, however will count for nothing if they come off the steamer on this side it may be in a highly fevered state resulting from a rough sea voyage and will not then stand the test. There may be good and sufficient reasons why these stringent measures are kept in force, but admitting that it be so, I nevertheless felt as I strolled through the rich pastures at Colinige, Lillycairn, and the Upper Mill, how bad a thing it was for Canada that the men who had done so much in the past in building up the grand herds of this country would not be there when these sixty and seventy of the finest young bulls that were to be seen within the same radius in any place in the world came to be offered for sale a few weeks after.

The discussion on this address was taken part in by J. C. Snell, H. Wade, C. M. Simmons, A. Rawlings, and D. McCrae. The general opinion of the meeting was that while cold storage would probably be of great benefit to shippers in the Northwest, that as far as Ontario was concerned the most satisfactory and profitable way was to ship animals alive.

It was moved by J. C. Snell, seconded by H. Wade, that this Association memorialize the Minister of Agriculture to so amend the regulations with regard to quarantine of cattle imported from Great Britain as to admit cattle upon presentation of a certificate from a veterinary inspector in Great Britain that they have passed the tuberculin test there. (Carried unanimously).

ELECTION OF OFFICERS AND DIRECTORS AND DELEGATES TO FAIR BOARDS.

The names of the officers and directors and of the delegates to fair boards will be found on page 22.

TUBERCULOSIS IN CATTLE.

By D. McCrae, Guelph.

The disease known as tuberculosis in cattle is almost identical with consumption in man. It is no new disease, but has been known for many centuries. In Europe 400 years ago laws were passed to prevent its spread amongst cattle, and for restricting the use of meat and milk from diseased animals. It is just about as common in cattle as in man. It is not confined to any country, any breed, or any age, but is much more prevalent amongst dairy cows than any other stock. While known everywhere, it is much more common in some sections of continental Europe than on this side of the Atlantic. It is well known in Maine, Michigan and most of the American States. In New York, Professor Law found from 5% upwards of affected animals In one case 98% of a herd were found diseased. In Scotland 20% of dairy cows have been found diseased in Edinburgh. Professor Wright, of Glasgow, estimates the yearly loss of Scottish farmers from tuberculosis at 440,000 pounds sterling, or over $2,000,000. In Denmark, Professor Bang tested 54 000 animals, and found the herds to vary from 20% to 50%, and an average of 39%. Saxony has even a higher rate. This disease is not confined to men and cattle, but attacks every kind of domestic animals. It is rare amongst horses and sheep : quite frequent in hogs and fowls. Wild animals are believed to be free from it in a wild state, but are very subject to it in confinement. It is found in the camel both in Egypt and Kirghees Steppes. Most of the monkeys taken to England die from this disease. In 1882 Dr. Koch, of Berlin, Germany, first isolated the germ of this disease which is known as the "Bacillus of Koch."

Contagious. The disease in man is believed to be largely spread by the sputum coughed up by consumptives and carelessly thrown about. When dried the minute germs fly in the air and are breathed by others, thus carrying the disease. In cattle the disease may be carried in much the same way, or by the saliva, in water troughs, or in feed boxes. Just how the germ is carried amongst cattle is not yet fully understood, but we know when a diseased animal is taken into a stable the others are liable to take the disease. Out on pasture there is little danger. In dark, badly ventilated stables the disease is more prevalent. Sunlight kills the germs quickly ; five hours of direct sunlight are sufficient ; a longer time of good light will do it. Germs live for months in a dark stable. Boiling water sterilizes fresh sputum instantly. Dried germs require half an hour to destroy them. They live through freezing or putrefaction for months In milk, 160 degrees for 15 minutes, kills the germs, or boiling for a few moments is effective. Salting or smoking has no effect on the virus. An ordinary healthy body has great powers of resistance. For a start one must have not only the living germ but the prepared soil before the germ can grow. This presupposes for infection a raw condition of exposed tissue, otherwise the germ gets no chance to grow. Even when the disease has got a start a strong system will frequently be able to throw it off Many animals take tuberculosis and are cured. This is found when inspecting animals slaughtered. Sometimes as much as 30% of animals examined have old traces of the disease.

Detection. In its early stages it is very difficult to detect the disease by ordinary methods. Its evolution may last for years, and is usually extremely slow. It is found in animals apparently quite healthy, which have fattened readily and are in perfect condition for the butcher. It is often found amongst animals, winners at fat stock shows. In 1892, an animal that won $160 in prizes was found to be quite rotten from this disease. Later in the disease cough, shortness of breath, hair hard and wiry, skin tight handling badly are signs of the disease in the lungs. In the abdomen signs are more difficult to detect, bloating, scouring, and general wasting may be noticed. The test now adopted, and the only one that is reliable is the injection of tuberculin. In 1890, Dr. Koch was credited with the discovery of lymph, which was at first supposed by some to be a cure for consumption in man. Thousands flocked to Germany to be treated and were disappointed. But while not a cure it is found to be a good detective. A very small quantity injected under the skin of a tuberculous animal raises the temperature 2 degrees or over. Formerly the tuberculin was not always correct, but recent tests have shown a very small percentage of errors. Tuberculin is a product of the bacillus grown in specially prepared beef tea.

Treatment. Having tested a herd with tuberculin by carefully taking the temperature of the animals in the stable during each two hours of a whole day and injected the tuberculin about 10 p.m., the animals will show a re-action next day if at all affected. Animals reacting should be isolated. Stables thoroughly disinfected by cleaning, washing with soft-soap and warm water, with a 5% solution of carbolic acid and thoroughly whitewashed. If the reacting animals be cows in calf, the calves may be kept and fed on the boiled milk of their mothers. If animals are in good condition they may be fattened for the butchers, and on being slaughtered the meat should be inspected by the local Board of Health. Usually the meat will be quite fit for food and perfectly wholesome. Careful rules have been laid down by the German Government for the inspection of tuberculous meat. These are based on a large number of tests made in Germany. Unless the tubercles are found in the muscular tissue, or the animal is very much wasted, there is no danger from the use of the meat.

Danger from Milk. There is much more danger from milk. It is still a moot point amongst scientists as to whether or not the milk be dangerous unless the udder be affected. It is very difficult to tell when the udder is affected. It is best to be safe and boil the milk of suspected animals before using it. There is little or no danger from the use of butter and cheese from the milk of a tuberculous herd.

Professor Bang, of Denmark, found that most of the bacilli were carried off in the butter-milk and whey. For the milk supply of cities, animals should be tested and the milk from those re-acting should not be sent to market but should be boiled and used for other purposes. There is little danger to an ordinary healthy person taking a glass or two of virulent milk at a meal. Practically the danger is only to people of weak health or those using milk raw as a chief food—that is children and certain invalids; but this danger is a real one and should be carefully guarded. The European Sanitary Congress of 1896 recommended: (1) Have dairy herds tested with tuberculin. (2) This testing to be done by Government officials who should brand infected animals. (3) Public compulsory abattoirs. (4) Compensation under conditions. The most recent suggestion that has been made in England is for: (1) Free inspection by the Government officials including testing with tuberculin and advice as to disinfecting and isolation. (2) Periodically testing and fattening and selling off to the butcher till the herd is free from disease.

Extent in Canada. While the disease is not unknown in Canada it does not seem to be especially prevalent. We have here in Ontario the best of food for keeping up good healthy herds—pure air and pure water. Unfortunately many of our older bank barns have basements for stock much too dark, we must have more sunlight in our stables. This is the great disinfectant; with care we may keep our herds practically free from this disease. But, first, active steps must be taken to isolate those few animals we have that are affected. In every herd these should be sought out, isolated, and fed for the butcher. There is no immediate alarm but there is need of the most careful vigilance. Consumption in man is not increasing; with us it seems to be decreasing as it is in the neighboring States. In Massachusetts, U. S., the death rate has fallen in ten years from 31.6 to 27.6, and, at the same time, of 3,295 cattle tested in one month 24.58 % were found tuberculous. It may be safely asserted that while consumption is the most terrible and costly of the diseases which affect humanity, by care, it can be greatly reduced amongst mankind, and in a few years almost exterminated amongst our cattle.

The meeting then adjourned.

FINANCIAL STATEMENT OF THE DOMINION CATTLE BREEDERS' ASSOCIATION

December 31st, 1897.

Receipts.

Balance from 1896	$ 182 24
Members' fees	75 00
Legislative grant	1,500 00
Miscellaneous	2 24
Total	$1,759 48

Expenditure.

Grants to other societies, fairs, etc., Provincial Winter Show	$1,178 93
Officers' salaries	150 00
Directors' fees and expenses	117 12
Postage and stationery	14 75
Printing	35 00
Cost of reporting	13 35
Typewriting and preparing annual report	83 55
Expenses of tent at Toronto, London and Ottawa, 1896, and at Toronto, 1897	53 32
Office supplies	15 50
Miscellaneous	10 57
Total	$1,672 09
Balance in hands of the treasurer	87 39

Examined and found correct this 5th day of May, 1898.

F. W. Hodson,
Treasurer.

James Russell.
D. McCrae. } *Auditors.*

INTERPROVINCIAL TRADE IN PURE BRED CATTLE

By John I. Hobson, Guelph.

In connection with my trip last summer to Manitoba, the Northwest Territories and Great Britain, I have been asked to give a few notes bearing on the live stock industry, particularly as to what is probable in the way of a growing interprovincial trade and the outlook for the export trade with Great Britain. If it was not that it is desirable that papers of this sort should be made as brief as possible, consistent with dealing properly with the subject, it might have been well to have dealt also with the subject of the rapidly growing trade of the maritime provinces, for to a certainty a great trade in pure bred stock is going to be carried on for some years to come at least, with our friends in the east.

In the first place I wish to acknowledge the courtesy of the different breeders' associations in passing a resolution which was forwarded to the Department of Agriculture of the Province of Manitoba and to prominent individuals, whom their official position or otherwise, causes to take a deep interest in all that tends to further the live stock interests of the Dominion. I found on reaching Winnipeg that arrangements had been made which would very much facilitate my travelling in the Province, and that the Premier, who is also Minister of Agriculture, and Mr. McKellar, chief clerk of the Department, had so planned matters as to give me the best possible opportunity of seeing what I was desirous of seeing, and of gathering information which I hoped might be of interest and of some value to the members of the Dominion Live Stock Associations which have their headquarters in Ontario. Before travelling in Manitoba I went through to the coast, purposing taking in the big ranch country on my way back. Between the time of leaving Calgary for the west and getting back, however, the great floods had occurred. The bridges on both driving roads and railroads to Fort McLeod had been washed away. As it was expected that the trains would be running in a week or so, I concluded to take in the Edmonton district first. Along the road from Calgary to Edmonton, dairying at different points is becoming quite an important feature, and already you hear the merits of the different dairy breeds discussed as to their value to cross on the common cows of the country. The dairy farmers there, as in Ontario, will, no doubt, have to pay more or less dearly for their experience—get the different breeds pretty well mixed up, and finally settle upon a type suited to the peculiarities of the soil, climate and product. For various causes, which in a short paper I cannot go into, I think that beef making as a specialty, along with mixed farming, will ultimately be found to be the most profitable line of farming in all that section north of Calgary to Edmonton, and for a considerable distance beyond it. It was gratifying to find that the enterprising spirit of the farmer and stockman in that part of the western country is being shown in the systematic way in which they are going to work in grading up their stock.

Coming back to Calgary I was much disappointed in finding that for a few days there would be no hope of reaching Fort McLeod or visiting the ranches which I was most anxious to see. In the meantime I visited some of the smaller ranches within the water circle, and found at the end of three days that there was no certainty of getting through, even if I made up my mind to wait a week longer. However, although I could not visit the big ranches, I was fortunate, on my way out, in meeting some of the most successful and prominent men engaged in that business—men whose whole interests are centered in the business—men who, from years of experience, (and some of it very dearly bought) have acquired a thorough, practical knowledge of the whole question of ranch farming.

It may be here said that out in this great ranching country a good illustration is to be seen of what is meant by the survival of the fittest. Many of the men who went into that business in the eighties with big notions, expensive habits, and but little practical knowledge, have gone to the wall; fast living and bad whiskey in a few cases hurrying on the operation. The men now engaged in the business are mostly shrewd, clever, and thoroughly practical, and may be properly termed strong men. As to the effect that the growth of the cattle industry in that country will have upon the stock interests of the eastern provinces or, more properly speaking, Ontario, I am very strongly of the belief that the business of supplying high class cattle to the stockmen of Manitoba and the Territories is only in its very infancy. My reason for coming to this conclusion would require a good deal of time to explain fully, but to put it briefly, if money is to be made in stock raising and feeding, it goes without saying that one of the first essentials is to have high grade stock. That can only be brought about by the use of first-class sires.

There is a class of farmers in Manitoba who have gone more or less into mixed farming, who had to be content with using inferior animals, simply because they were not in a position to buy better ones. These times have changed, and we may depend upon it that the day for dumping the mean looking specimens of pedigreed animals along the line of the C. P. R. in the west, to be distributed over the country tributary to it, is past. The Ontario breeder had better make up his mind as quickly as he can to this and act upon it promptly. He has got to place before himself a much higher standard of excellence than some of the breeders have done in the past. The best of the pure bred cattle that can be raised in the east is going to be none too good to supply the demand that is springing up.

There is no better educator along these lines than the show ring, and there is no better criterion of what is going on than to note carefully the exhibits from year to year. There were some of the formost and best posted breeders of high class cattle in Ontario at the Winnipeg show last year, and, like myself, they had had the opportunity of comparing it with the exhibits of former years, and I am sure they will bear me out in saying that there was marked evidence of a great development tending towards higher breeding. The grade steers shown in the beef classes would have made a very strong exhibit if shown at the Toronto Industrial. It may be asked cannot the high class breeding stock, which will be required from year to year to replenish and provide fresh blood for the herds in this vast extent of country, be more cheaply bred and raised within the limits of Manitoba and the Territories than in Ontario, when the cost of transportation is to be added? I do not think they can. The raising of high class cattle is a special department of the stock industry which requires more artificial treatment than can be well carried on in that country with its large farms, its long winters, its short and very busy summers, and the much greater cost in providing suitable buildings,—and it may further be said that however progressive the western men may be, it is going to take them a good many years to build up herds possessing the strong, fixed type so characteristic of many of the best herds in Ontario.

Coming back to Winnipeg, a week was spent at the Industrial Show, and all that I have said about the strong tendency toward higher breeding was to be seen strongly emphasized in the show ring. At the coming show the mark will again go away up. It is well known that during the last six months many of the best animals in the best herds of Ontario have been bought to go to the Prairie Province. Very high prices in some cases have been paid, and the battle royal which is going to take place is looked forward to with a good deal of interest in many quarters.

A few words to those who have not followed closely the work being done by the Dominion Cattle Breeders' Association may not be amiss, for of all the associations which have for their object the advancement of the agricultural interests of this country, there is no other which has shown more vitality or which has proved to be a greater power for good. The good work which has been going on can be recognized along many lines, and what has led up to these good results can be easily traced. We do not want to take more credit for work done by the Association than properly belongs to it, for we fully realize that other factors have been at work which have tended very much to bring about many changes for the better. Formost of all, perhaps, is the fact of having two eminently able men at the head of the Departments of Agriculture at Ottawa and Toronto, men of large grasp, broad ideas, extended practical knowledge and imbued with a strong desire to work for the best interests of the people, men in whom the farmers of this country have the utmost confidence, and whom they can rely upon at all times to work for their best interests. Then again it is not too much to say that the members of the Association, speaking in a general way, comprise the progressive men from all the other cattle breeders' associations, and that the work being done by the Association is in harmony with that carried on and desired to be carried on by those representing the various pure-bred associations, or, in other words, the representative men along all the various lines of the breeding of pure-bred cattle of the meat producing and dairy breeds, as well as those engaged in handling grade stock and the feeding of export cattle, are all working with one end in view, that object being the producing of a better article coupled with economy in production. That we are succeeding in no small measure along some lines is abundantly evident. Especially gratifying is the marked change for the better in our butter making industry, the steady and rapidly increasing demand, and the higher relative position of Canadian butter as compared with that of other countries during the past two years in the cities of Great Britain means to this country a great deal in the aggregate.

Looking back at the business of last year the one weak feature was the exceedingly unprofitable work done in export cattle. It is becoming more evident every year that some radical change must be made in our system of supplying beef for the British markets. It will never be on a satisfactory basis until we find some other way of using the ill-bred, half-fed and inferior stuff which finds its way along with the really good cattle which go from Canada. The English people have no use whatever for anything but the best. When in the Old Country last summer I spent much time in studying out this particular question in the great consuming centres of England and Scotland, spent days in the great markets of London, Liverpool, and Glasgow, and discussed the matter very fully with many of the most prominent men in the trade. The same thing was told me everywhere and that was that there is nothing better goes into their markets than the best of Canadian cattle, but to offset that there is a large percentage of poor and inferior stuff, and that a uniform quality cannot be depended upon at any time.

TENTH ANNUAL REPORT

OF THE

DOMINION SHEEP BREEDERS ASSOCIATION.

The annual meeting of the Dominion Sheep Breeders' Association was held in the Grand Trunk Reading Room, Brantford, December 8th, 1897, the President, Mr. James Tolton, in the chair.

THE PRESIDENT'S ADDRESS

The following is the address delivered by the President:

In my official position as your President, you will again expect of me a short address to review the work of our Association for the past year; also, if possible, to throw out some suggestions that may be helpful in the way of making the Association a power for greater good than in the past, and of making the sheep industry more prosperous and successful.

The work of the Association for the past year, mainly under the direction of the untiring industry of your Secretary, has accomplished as much or more work to further the interests of the Association and to improve and encourage the sheep industry as any of the preceding years Through the efforts of our representatives at the various fair boards we are year by year succeeding in getting judges appointed who are better informed on the merits and characteristics of the different breeds of sheep, and are also being heard as to the better adjustment of the prize lists, and the better management at the shows as far as the sheep exhibit is concerned.

In connection with this matter, perhaps it would not be out of place to ask you to consider whether or not it is in the interests of the exhibitor or of the industry that the sheep exhibit should be obliged to be on exhibition at Toronto the first week in addition to the second week as formerly. Your Transportation Committee, mainly through your Secretary, has been enabled to get some concessions from the railroad companies that are materially in the interests, not only of the shipper, but also of the purchaser, more particularly in shipping to the Northwest. I think there is still work to be done along this line, and would suggest that it be done as in the past in conjunction with the other live stock associations. An effort was made by this Association, during the revision of the tariff by the present Government of the Dominion, to have the tariff regulation adjusted so that it might be more in the interests of the sheep industry. Nothing very materially was accomplished, nor, in my opinion, can be, under our present condition, unless influence can be brought to bear on the Government of the neighboring Republic, our best customers, that we may have freer access to their markets.

At some of the meetings during the past year it was discussed and some action taken with a view of getting a portion of the trade of the Argentine Republic in pure-bred stock for breeding purposes. I think this is a question that should not be let drop, but that the efforts that have already been put forth to induce the flockmasters of that Republic to purchase some of the breeding stock here should be followed up, as I think we have stock to offer as good as can be got elsewhere; and if a portion of that trade can be secured it will be of mutual advantage. In connection with the funds of the Association your directors thought it wise to continue the course pursued by their predecessors for the last three years, and have united these funds with the funds of some of the other live stock associations, and with the help of the Government hold a successful winter show. Whether this course is to be pursued in the future is for you to say.

I have referred briefly to the work of the Association during the past year. What about the coming year? I think we can safely say that the work of the Association has been helpful to the industry since its organization, but I think there is still work that we may do. In my opinion our work is not alone the improvement and the encouragement to improve our different breeds, but should we not do something to induce the farmers of Ontario to rear and keep more sheep? Why is it that with a climate and the other requirements, not excelled if equalled by any other part of the continent for the successful breeding and feeding of sheep, that there are now fewer sheep kept in this Province than there were even two years ago? According to the report made by the Bureau of Industries, we had, in 1895, 2,022,735; this year it reports 1,690,350; a falling off in numbers of 332,385. Is it not with good reason we ask, why is it that our farmers are rearing and keeping fewer sheep than in former years? Is it because the sheep industry has ceased to be pecuniarily profitable, or is it that sheep are less profitable than some other lines of stock on the farm? I see one writer at least says that it is because our farmers are giving more of their attention to dairying than formerly and less to the breeding of sheep I might fairly ask, have we as an Association done our whole duty in this matter? Have we kept before the farming community generally the place and importance that sheep should take on the farm? In my opinion, taking into account the capital invested and the labor expended, sheep are as profitable as any other stock kept on the farm. As a suggestion to remedy this matter, might we not as an Association do something to induce our best writers to contribute some good, sound and stirring articles on this question for publication in our agricultural press. No doubt other and perhaps better methods may be suggested. Without at all expecting that anything I may say or anything we may do as an Association along this line may be the means of inducing our farmers to keep sheep in proportionate numbers to what they are kept on the farms in Britain, still I think it is our duty to make some effort in this direction whereby more sheep may be kept in this, the banner sheep Province of the Dominion.

At our last annual meeting I stated in my opening address that in my opinion the prospect was much brighter for the future than it had been for the past two or three years, and that we might look for a more active demand and at better prices. It is my pleasure to be able to report that this has been brought about either by the foolishness or want of foresight of our neighbors across the national line.

In conclusion I would bespeak for my successor in office the same courtesy and assistance in his duties as you have extended to me.

NOMINATION OF DIRECTORS.

It was moved by Richard Gibson, seconded by D. G. Hanmer, that while selecting expert judges the representatives of each breed also name the director to represent them on the Board of the Directors of the Association. Carried.

The expert judges selected are as follows:

Cotswolds. J. C. Snell, Snelgrove; Wm. Thompson, Uxbridge; John Thompson, Uxbridge; Thos. Teasdale, Concord; Jas. Russell, Richmond Hill; Jas. Main, Milton; H. Rawlings, Ravenswood; V. Fitch, Oriel; Geo. Weeks, Glanworth; T. Hardy Shore, Glanworth; W. G. Laidlaw, Wilton Grove, D. McCrae, Guelph; J. G. Snell, Snelgrove; Peter McGregor, Mimosa; Wm. Rae, Arkell; Wm. Ward, Uxbridge; Joseph Ward, Marsh Hill; John Park, Oriel; S. Coxworth, Whitby; Jas. Murray, Cresswell; Jos. D. Davidson, Belhaven; S. J. Lyons, Norval, Ont.; Wm. Petch, Blackheath; Jos. Gaunt, St. Helens; A. Johnston, Greenwood.

Leicesters. E Parkinson, Eramosa ; John Orr, Galt ; William Watt, Salem ; Wm. McIntosh, Burgoyne ; Thos. Currelly, Fullarton ; R. Eastwood, Mimico ; John Kelly, Shakespeare ; Andrew Thompson, Fergus ; J. K. Campbell, Palmerston ; J. C. Snell, Snelgrove ; Jos. Snell, Snelgrove ; G B. Armstrong, Teeswater ; John Gibson, Denfield ; C. E. Wood, Freeman ; Jos Gaunt, St. Helens ; J. M. Gardhouse, Highfield ; John Laidlaw, Wilton Grove ; Andrew Whitlaw, Guelph ; Wm. Whitlaw, Guelph ; R. C. Martin, Marysville ; Alex. Smith, Maple Lodge ; A Baskor, Thistletown ; Alex. Waldie, Acton ; Walter Nichol, Plattsville ; H. G. Arnold, Maidstone.

Judge for Toronto.—J. C. Snell, Snelgrove. Reserve.—R. Eastwood, Mimico.

Judge for London.—Wm. McIntosh, Burgoyne. Reserve.—W. Nichol, Plattsville.

Judge for Ottawa.—J. M. Gardhouse, Highfield.

Judge for Montreal.—John Orr, Galt.

Judge for Guelph.—Jos. Gaunt, St. Helens.

Judge for Brantford, Alex. Smith, Maple Lodge.

Dorsets. Thomas Hector, Springfield-on-the-Credit ; John Jackson, Abingdon ; Richard Gibson, Delaware ; R. H. Harding, Thorndale ; T. S. Cooper, Coopersburg, Pa. ; M. A. Cooper, Coopersburg ; John Hunter, Wyoming ; G. P. Everett, Mt Vernon ; Mortimer Levering, Lafayette, Ind. ; Jas. Hanmer, Mt. Vernon ; J. C. Snell, Snelgrove.

Southdowns. John Millar, Markham ; Wm. Martin, Binbrook ; R. Gibson, Delaware ; John Jackson, Abingdon ; T. C. Douglas, Galt ; Henry Arkell, Teeswater ; W. H. Beattie, Wilton Grove ; W. Simenton, Blackheath ; Geo. L Telfer, Paris ; J. G. Hanmer, Mt. Vernon ; J. Scott, Aberfoyle ; G. Baker, Simcoe ; F. W. Barrett, Wadsworth, N.Y.

Oxfords. Smith Evans, Gourock ; Jas. Tolton, Walkerton ; R. J. Hine, Dutton ; Henry Arkell, Arkell ; Wm. Dickenson, Mildmay ; Peter Arkell, Teeswater ; Herbert Wright, Guelph ; John Harcourt, St. Anns ; J. H. Jull, Mt. Vernon ; Henry Arkell, Teeswater ; John E. Cousins, Harriston ; Elmer Turner, Burford ; Arch. McKenzie, Corwhin ; R. E Birdsall, Birdsall ; Geo. McKerrow, Sussex, Wis. ; W. A. Shafor, Middleton, O. ; J. C. Williamson, Xenia, O. ; C. C. Keinar, Brockville, Ohio.

Hampshires. Henry Arkell, Arkell ; Henry Arkell, Teeswater ; R. Gibson, Delaware ; I. Hiller, Tourtown, Mich. ; John Kelly, Shakespeare.

Lincolns J. T. Gibson, Denfield ; William Oliver, Avonbank ; E. Parkinson, Eramosa ; T. E. Robson, Ilderton ; G. Walkerton, Ilderton ; John Geary, London ; J. C. Snell, Snelgrove ; R. W. Stevens, Lambeth ; L. Parkinson, Eramosa ; T. Rolph, Ballymote ; L. Goodwin, Monroe.

Merinos. W. M. Smith, Fairfield Plains ; R. Shaw, Glanworth ; W. H. Beattie, Wilton Grove ; Rock Bailey, Union ; And. Tirrell, Wooler.

Shropshires. Richard Gibson, Delaware ; G. P. Everett, Mt. Vernon ; J. Conworth, Paris ; W. H Beattie, Wilton Grove ; A Brown, Picton ; Robert Miller, Brougham ; J. Hanmer, Burford ; James McFarlane, Clinton ; J. Cooper, Kippen ; T. M. Whitesides, Innerkip ; J. Campbell, Woodville ; D. G Hanmer, Burford ; James Phinn, Hespeler ; M. Levering, Lafayette, Ind. ; A. Elliott, Galt ; S. H. Todd, Wakeman, O. ; J. Dickin, Milton West ; John L. Thompson, Gas City, Ind ; George Allen, Allerton, Ill. ; W. G. Pettit, Freeman ; D. J. Campbell, Woodville ; G. Phinn, Hespeler ; Chas. Calder, Brooklin ; H. N. Gibson, Delaware ; Geo. Hindmarsh, Ailsa Craig ; C. W. Gurney, Paris ; W E. Wright, Glanworth ; J. Miller, Brougham ; H Hanmer, Burford ; A. McMillan, Lorneville ; A. McKay, Woodville ; J. E. Cuflland, Richland Centre.

Judges for Toronto.—Geo. Allen, Allenton, Ill. ; W. H. Beattie, Wilton Grove. Substitute.—W. E Wright.

Judges for London.—R. Miller, Brougham. Substitute.—G. Everett, Mt. Vernon.

Judges for Montreal.—R. Gibson, Delaware. Substitute.—H. Hanmer.

Judges for Ottawa.—John Miller, Brougham. Substitute, Chas. Gurney, Paris.

The following correspondence was received by the Secretary from Mr. Thos. A. Browne, Secretary of the Western Fair, London :

London, Ont.. Sept. 30th, 1897.

Dear Sir :—A very important thing took place at the late Western Fair, and a matter that I am instructed to bring to the notice of the Dominion Sheep Breeders' Association. As you are aware for the past years the Western Fair Association has accepted your nomination of judges in the several classes of sheep, and from your nominations have selected the judges. This rule we followed this year, selecting R. Miller, Brougham, a judge, and J. Conworth, Paris, reserve on Shropshires. Mr. Miller declined on account of being an exhibitor, and Mr. Conworth was then requested to act, which he did with very bad results, as the enclosures will explain. First note the protest and the causes assigned, and then the report of the committee of investigation.

Now for my own part I do not feel like having anything to do with the nominations of the Dominion Society unless the members have backbone enough to object to any nominations when they are made if they think the gentleman not fitted, for any cause, to act as judge. You see that the onus falls on the Fair Association without any reason, after having accepted the exhibitors' (or the majority, perhaps all) own choice.

Pardon me for an opinion, but I think the members should stand up and object at the time, and on the slightest good reason being given the name should be dropped by the meeting.

Have given a copy of the Committee's report to Mr. Campbell, and am mailing one to Mr. Conworth to-day.

Here is an opportunity for good that should not be lost. Kindly bring this matter up at your annual meeting, and oblige,

Yours very truly,

(Sgd.) Thos. A. Browne,
Secretary.

The Western Fair Association, London.

Form of Protest.

To the Board of Directors of the Western Fair Association, of the City of London, Ontario.

Gentlemen :—I hereby protest against the decision of the judge in making his awards in Class 25 Section, all except specials.

This protest is entered in accordance with the Rules and Regulations as printed in the Western Fair Prize List of 1897, under the heading "Protests," on page 12.

The following are my reasons for making the protest, viz. :—In judging the section in said class the judge made a very slight examination of the rams. He did not examine their heads or fronts He awarded the first premium to a sheep largely deficient in the fleshing qualities, which is the chief point in a mutton sheep. The said ram is comparatively valueless as a stock ram, which is to be seen in his imperfect testicles, and proved by the fact of his only getting two ewes in lamb though three years old, and used in two flocks in England.

The time the judge made the above awards was at 2 to 4 o'clock on the 24th of September, instant.

Dated at London, this 14th day of September, 1897.

Complainant's signature,— (Sgd.) John Campbell.
P. O. Address,— Woodville.

Received the protest and five dollars within four hours of the time above dated.

(Sgd). Thos. A. Browne,
Secretary.

To the President and Board of Directors of the Western Fair Association:

We the undersigned, your committee appointed to investigate the protest of Mr. John Campbell against the judging of Mr. J. Conworth, on Shropshire sheep, have investigated as far as we can, and found Mr. Campbell is fully justified in making his protest.

We would further recommend that the deposit of $5 be returned to Mr. Campbell.

We also further recommend that the matter be laid before the Dominion Sheep Breeders' Association in time for them to discuss it at their annual meeting, where judges are selected, and we would also recommend that they take great care in moninating men for the duties of judge, so that no repetition of this case may occur, as it reflects discredit on the Association appointing them.

All of which is respectfully submitted.

(Sgd) WM. MOORE.
(Sgd) CHAS. E. TREBILCOCK.
(Sgd.) JOHN KENNEDY.
(Sgd.) J. LAIDLAW.

It was moved by ROBERT MILLER, seconded by J. G. HANMER, that in the opinion of this, the Dominion Sheep Breeders' Association, the Western Fair Board has deliberately insulted Mr. John Conworth, a member of our Association, recommended by us as a judge on Shropshires for their exhibition held in September last. Said insult appeared in a report of a committee appointed to investigate a decision of said John Conworth, and the insult was repeated and enlarged on by a communication from Mr. Browne, Secretary of Western Fair, to this Association. We therefore demand an apology from the Western Fair Board for language used in said report and letter. (Carried with but two dissenting votes, John Campbell and nephew.)

Report of the committee appointed at the last annual meeting to devise a plan whereby the judging at District and County Fairs might be improved. The committee consisted of John Campbell, Woodville; Richard Gibson, Delaware, and D. G. Hanmer, Burford. The report read as follows:

As instructed at our last annual meeting, we now report that in our opinion one judge would give much better satisfaction at the local and district fairs than three, often set to work not because of their competence but more as a matter of convenience or friendship. Who has not seen ridiculous and most provoking decisions given by such men, who in some cases have been known to act, yet never having bred or owned a sheep.

Whenever possible the judge should be a breeder of that class of sheep he undertakes to judge. The competent judge should be paid his necessary expenses, and at least as much more as would provide a substitute in his absence from home. Further, we believe that a list of very competent young men could be selected and advertised by this Association, from among the many who are the feeders and fitters of the show flocks which annually grace our show yards, and of which we are justly proud. For where are better fed or fitted sheep to be found? Can anyone doubt that those young men who so thoroughly study their own charges and the flocks of their comrades during several weeks year by year are fast becoming the real experts, and are therefore the best fitted for the righteous placing of premiums By employing them at the smaller fairs they would gain confidence, and we believe thereby a long step in advance would be taken by the sheep breeders of our fair Dominion. As one of the results, more correct types would be sent to the top, as the best in the ring, and the interested public would learn to distinguish between a Shropshire and a Lincoln, something which some judges fail in doing.

Finally, give the young men a chance to show their ability; give the flocks fair play, and we shall long continue to lead on this continent, and probably live to see, or hear, of laurels won on distant shores.

(Signed) JOHN CAMPBELL,
D. G. HANMER,
RICHARD GIBSON.

It was moved by R. J. HINE, seconded by J. C. SNELL, that the report as read be adopted. (Carried.)

ELECTION OF OFFICERS AND DIRECTORS.

For list of officers and directors, and delegates to fair boards, see page 23.

The following paper was read by Mr. Mortimer Levering, Lafayette, Ind., Secretary of the American Shropshire Record Association, on

THE REQUIREMENTS OF THE HOME AND FOREIGN MUTTON AND WOOL MARKETS.

The most essential requirement to-day is, more wool and mutton. We are generally in the fix of a man that lived out in the Western States during the campaign of gold *versus* free silver, this local politician said: "I have analyzed the proposition and know that it is not either more gold or more silver that we want, but more 'collateral,' yes, more collateral is the thing. Why, I wanted to borrow some money and went to a dozen different banks, and each one asked me exactly the same question, 'What collateral have you?' I answered, 'None at all.' They would then say, 'Well, get some good collateral and you can have all the money you want.' Now gentlemen, I am looking for more collateral and I will be all right." So to-day we are in most cases confronted with the same dilemma, we need more sheep.

Until the spring of this present year, each season for the past four or five, saw the wool and sheep market in a weaker condition than the preceding one. On every hand was discouragement and disappointment, and to add to the misery of the flockmasters a new disease attacked their flocks. But we are now enjoying a dawn of prosperity and soon again will be in the glory of the full sunlight of successful and profitable sheep business. The depression in the sheep trade was due to several causes, principally that of the duty having been taken from off imported wool in the States, and as the sheep raisers had for years grown for wool product alone, they could not afford to compete with the wool from foreign markets. As this class of sheep growers were in great majority, the cry of "Wolf, wolf," from them sounded an alarm that frightened all the others to give up their flocks and go out of the business. An illustration of how closely our two countries are allied in their interests is evidenced in this instance, for the depression in the States was followed by a similar experience in Canada During all this time a new condition of things was arising, the wool and mutton markets at home and abroad were changing and advancing in certain lines. Our people were slow to grasp the situation or to read the signs of the times, and, like the foolish virgins, are found to-day "without oil in their lamps," and crying out in the cold "Let me in." It is too often the case that men launch in business on a flood tide and lose by going out at its ebb. The wisest are those that study the markets and come in with the tide of prosperity, prepared to meet the demand of the profitable market.

The restoration of a tariff in the States is not alone the factor in this new era of sheep market prosperity. True it encouraged those who act on impulse and sentiment, and who go up and down with political influences, those who go into business and out of it again as their party leaders encourage or discourage. If we make an inspection of the sheep brought in for sale in some of our largest stock yards, as we have done in the past few days, one cannot but ask what kinds of beasts are these? Ninety-eight per cent. of them are not worthy the name of sheep; they are not even fit for guano, for flesh they have not, bones they are not, wool it is not. While this sort of nondescript trash is supplied to our markets sheep husbandry should not lay claim to a place, in our day of advanced agriculture and modern civilization: they are not what is wanted either at home or abroad. Even to-day men who ought to know better are trying experiments with breeds that if followed by many, will keep us back in the business another decade. The hog raisers have long since reached the standard of excellence in their business and have their stock uniform and of the character that the markets of the world demand.

They are displaying more judgment and common sense than the average sheep raiser. It may be necessary to make men gain more knowledge by governing their actions per force of law, but this is a day of advanced thinking, and then men who are no better than the law makes them are no better than the devil would have them. Men need no longer experiment with crossing one breed with another. Put up two questions where you can always see them, then work to them. They are these: What kind of mutton does the market demand? What kind of wool does the market want? Remembering always that it means *to-day*, not what the demand was fifty years ago, not last year or yesterday, but to-day and the future. The highest priced sheep sold in our markets to-day are those that are suited for the clubs and hotels in our largest cities. For such sheep a ready market is found at twenty-five or thirty cents per pound. When you can get thirty-seven to forty-three dollars for the carcass of a lamb or wether, you are entitled to a distinction as a sheep grower. In the large stock yards of our country, the highest price is paid for export mutton. Such sheep must be well matured at an early age, large and uniform, with good solid flesh, not too fat and not at all lean. Ordinary common sheep put up in pens and gorged on rich feed or swill from malt houses will not meet the demand; such sheep are too fat and the meat will never harden.

Sheep must be of a good breed, capable of maturing early, of good constitution by heredity, so that they can attain size and weight with exercise and on dry feed. The exercise makes muscle, and that is lean meat. Such sheep stand shipping and do not shrink or soften. Our export sheep come in competition in the foreign markets with those from many other countries, and we should take a national pride in having our product compare favorably with any others. We have greater range, better feed, and more favorable conditions to grow perfect animals than almost any other country, and all it needs to give us the credit abroad of producing the best and securing the maximum price and maintaining a steady trade, is for our growers to use their brains and couple their work with intelligent reasoning. The kind of wool in demand on both sides of the Atlantic is of exactly the same character. A medium delaine, not too fine and not too coarse; but we need not expect to ship any wool from our countries for many years to come, as all the wool we grow does not amount to sixty per cent. of the home consumption. The total amount of wool produced in the United States during the past year was 272,474,708 lbs., while the amount imported this year is 350,852,026 lbs. During the last ten years our production of wool has steadily decreased from 302 millions to 272 million pounds in 1897, while our imports have increased from 113 million to 350 million pounds. The same ratio will apply to Canada in proportion to the population. The chief reason why so much wool is imported is that the manufacturers demand a certain quality known as "Capes," and our countries grow but a small proportion of that kind, so that a large percentage of what we do grow brings a lower price

The value of sheep in this country was highest in 1895, and has decreased each year since until our present year, when it has reached the minimum in thirty years. It is not speculative, therefore, for us to say that we are on the threshhold of an unprecedented boom in sheep husbandry. Let us be prepared to meet it not blindly, wildly, or recklessly; let us rid out our farms of scrubs and indifferent sheep. Have fewer but better ones, determine to send to market only sheep of the best quality of wool and mutton, to the end that the stock reports will soon cease to report such classes as "mixed," "culls," and "tail ends." Let all be of such a high standard of excellence that they will reflect as much credit to the American farmer at home and abroad as is given to the educational, mechanical, scientific, architectural and agricultural resources of our great country, which is the envy of the whole world.

After the paper there was a short discussion opened by Mr. C. W. YAPP, of Brantford.

The meeting then adjourned.

FINANCIAL STATEMENT OF THE DOMINION SHEEP BREEDERS' ASSOCIATION.

DECEMBER 31ST, 1897.

Receipts.

Balance from 1896	$ 319 24
Members' fees	93 00
Legislative grant	1,500 00
Miscellaneous	3 83
Total	$1,916 07

Expenditure.

Grants to other societies, fairs, etc., Provincial Winter Show	$1,361
Officers' salaries	150
Directors' fees and expenses	147 05
Postage and stationery	18 75
Printing	32 04
Cost of reporting	13 35
Typewriting and preparing annual report	83 56
Expenses *re* tent at Toronto, London and Ottawa in 1896, and Toronto in 1897	53 32
Office supplies	16 30
Miscellaneous	17 79
Total	$1,894 09
Balance in the hand of the treasurer	21 98

Examined and found correct this 7th day of May 1898

F. W. HODSON,
Treasurer.

ANDREW WHITELAW, }
G. E. DAY, } *Auditors.*

NINTH ANNUAL REPORT

OF THE

DOMINION SWINE BREEDERS' ASSOCIATION.

The annual meeting of the Dominion Swine Breeders' Association was held in the Grand Trunk Reading Room, Brantford, on December 9th, 1897, the President, Mr. Jos. E. Brethour, in the chair.

The President's address was read and adopted.

PRESIDENT'S ADDRESS.

It affords me great pleasure to be able to congratulate you upon the splendid advance which has been made by the Dominion Swine Breeders' Association during the two years which I have had the honor of being your President. I am pleased to say that we have had the utmost harmony existing among the members of our Association, and they have all worked together for the advancement of the great and ever increasing industry which we represent. It is also my pleasure to congratulate the several breeders of swine upon the successful and profitable season which they have experienced during the past year. It is many years since the breeders of pure-bred swine have had such a successful season, and there are brighter prospects in the immediate future. It is a matter of congratulation when we look back upon the marvellous advance which has taken place in the swine industry in Canada during the last decade. Previous to that time our swine products were scarcely known in the English markets, but to-day they stand almost at the top, if not at the top, in regard to quality and price. I have recently been informed that Canadian bacon is likely to displace the once famous Danish bacon, which has always been looked upon as the best. Our bacon curers inform me that if they could get a full and regular supply during the whole year that they could pay better prices, and it would place them in a better position to hold their trade in the English markets, being able to supply their customers regularly with the quantity required. The practice which is at present followed by most of our farmers and feeders is to have most of the hogs ready for sale during the months of September and October. This has the effect of over-crowding the packing houses at that season of the year, and during the rest of the season they are not running to nearly their capacity, but I am pleased to observe this system is gradually changing. I see no reason why feeders of swine in Canada should not capture the English trade for their products. We have as good a class of feeders, as good feed, and as good a class of hogs in Canada as in any country in the world. What we require are more hogs, a little better judgment in having them ready for the market at regular intervals throughout the entire year, and a careful selection as to the type and form of hog required to produce the highest quality of meat. When we take into consideration the cost of grain and mill feed, the prices that have been realized for hogs during the past twelve months would certainly indicate that there was a larger margin of profit in feeding hogs than any other class of live stock, and farmers ought to raise more pigs, having due regard to the quality for the requirements of the market.

Again referring to the work accomplished by our Association, I beg to draw your attention to the heavy task that was undertaken in re-organizing our Swine Records and Herd Books. You are all familiar no doubt with the satisfactory arrangement made with

Mr. Henry Wade for recording the pedigrees of our pure-bred swine. We have a Herd Book published annually, and the rules and regulations governing the recording of the pedigrees of the different breeds are all under the control of those who are most interested in each of the different breeds. One-half the funds realized from the fees charged for recording pedigrees goes into the funds of the Association. From December 1st, 1896, to December 1st, 1897, three thousand and five pedigrees have been recorded, netting to us the handsome sum of $826 in twelve months. Another splendid work that has been undertaken is the issuing of a live stock bulletin which is published once each month, and gives to the members of this Association the advantage of making known to the purchasing public where animals that they are in search of may be purchased. This is a great advantage to purchaser as well as seller. Our members are also kept posted as to the work of the Association. I also beg to draw your attention to the grand work which has been accomplished in bringing together such splendid specimens of the different breeds of swine which are now on exhibition at our Winter Fat Stock Show. I am safe in saying that if it had not been for the untiring energy and enthusiasm displayed by our worthy secretary, Mr. F. W. Hodson, the Winter Fat Stock Show would never have been in existence.

In conclusion, I would urge the breeders of pure-bred swine to endeavor to produce the very best of the kind they consider best suited to meet the requirements of the trade, and to exercise charity with those who are breeding other breeds; each of the different breeds has its advantages. It is very much owing to the united efforts of the breeders of the different breeds that such good work has been accomplished by the Dominion Swine Breeders' Association.

It was moved by JOS. FEATHERSTONE, seconded by GEORGE GREEN, that while selecting expert judges the representatives of each breed also name the director to represent them on the Board of the Directors' Association. Carried.

EXPERT JUDGES APPOINTED.

Berkshires. H. J. Davis, Woodstock; J. C. Snell, Snelgrove; Thos. Teasdale, Concord; George Green, Fairview; Robert Vance, Ida; T. A. Cox, Brantford; Jas. Quarrie Delaware; Jos. Featherston, M.P., Streetsville; S. Coxworth, Whitby; R P. Snell Snelgrove; Malcolm McArthur, Lobo; C R. Decker, Chesterfield; J. G. Snell, Snelgrove; Chas. Youngs, Brooksdale; Wm. Jones, Zenda; D. DeCourcey, Bornholm; Geo. Thomson, Bright; Robert Gibson, Galt; R. H. Harding, Thorndale; Jos. Yuill, Carleton Place; W. C. Edwards, Rockland; Jos. Barnett.

Yorkshires. Richard Gibson, Delaware; Henry Deddels, Kossuth; Sharpe Butterfield, Windsor; J. E Brethour, Burford; G. B. Hood, Guelph; Jos. Featherston, M.P., Streetsville; H. E. Sharpe, Ida; A. F. McGill, Hillsburg; J. G. Mair, Howick, Que.; J. M. Hurley, Belleville; Geo. Greer, Grand Valley; Jas. Stephen, Trout River, Que.; R. McLellan, Harriston; Jos. Fletcher, Oxford Mills; Robert Nichol, Brussels; A. and F. Foreman, Collingwood; J. Y. Ormsby, Woodstock; F. O. Fearman, Hamilton; J. W. Flavelle, Toronto.

Chester Whites. Wm. Jones, Zenda; J. C. Snell, Snelgrove; George Green, Fairview; J. E Brethour, Burford; D. DeCourcey, Bornholm; R. Dorsey, Burnhamthorpe; R. H. Harding, Thorndale; W. E. Butler, Dereham Centre; G. B. Hood, Guelph; G. E. Day, Guelph; Thos. Teasdale, Concord; S. H. Todd, Wakeman, Ohio; J. G. Snell, Snelgrove; Gideon Snyder, Jarvis; Henry Jones, Zenda; Jos. Cairns, Camlachie.

Poland Chinas. Thos. Teasdale, Concord; S. H. Todd, Wakeman, O.; Jos. Featherston, M P., Streetsville; J. H. Snarey, Croton; Jas. Main, Milton; Capt. A. W. Young, Tupperville; George Green, Fairview; Wm. Smith, Fairfield Plains; Jos. Brethour, Burford; Wm. Jones, Zenda; Oliver Drury, Fargo; R. Dorsey, Burnham, thorpe.

Duroc-Jerseys. Jos. Featherston, M.P., Streetsville; Peter Lamarsh, Wheatley; Wm. Jones, Zenda; J. G. Snell, Snelgrove; Geo. Green, Fairview; Thos. Teasdale, Concord; S. H. Todd, Wakeman, O.; Geo. McGarvin, Chatham; R. H. Harding, Thorndale; D. DeCourcey, Bornholm; Wm. Tape, Ridgetown; Wm. Smith, Burford; Harry Jones, Zenda; Herbert George, Crampton.

Tamworths. N. H. Blaine, St. George; A. Dunn, Ingersoll; J. H. Simonton, Chatham; G. North, Marden; A. Elliott, Galt; L. F. Master, Haysville; A. O. Hallman, New Dundee; F. Shore, London; J. Bell, Amber; D. G. Hanmer, Burford; John Nichol, Hubrey; Jos. Brethour, Burford; H. Caldwell, Orchard; W. Elliott, Hamilton; C. C. L. Wilson, Ingersoll; C. Fearman, Hamilton; And. Laurie, Wolverton; Wm. Davies, Toronto.

Suffolks and Essex. S. Butterfield, Windsor; R. Dorsey, Burnhamthorpe; Jos. Main, Milton; David McCrae, Guelph; Jas. Anderson, Guelph; Simon Lemon, Kettleby; T. C. Douglas, Galt; Wm. Eliot, Milton; James Millar, Guelph.

The names of officers and directors and the delegates to fair boards will be found on page 24.

Addresses were delivered by Mr. Chester Fearman, of Hamilton, and Mr. C. C. L. Wilson, of Ingersoll, on "The Ideal Hog for the English Market," with illustrations showing the ideal, the overfed, and the too lean, sides, after which the meeting adjourned.

FINANCIAL STATEMENT OF THE DOMINION SWINE BREEDERS, ASSOCIATION.

December 31st, 1897.

Receipts.

Balance from previous year	$1,365 01
Members' fees	542 00
Legislative grant	1,200 00
Record fees	971 23
Miscellaneous	7 83
Total	$4,086 07

Expenditure.

Grants to other societies, fairs, etc., Provincial Winter Show	$1,160 99
Cash paid for prizes at Winnipeg Industrial	76 00
Officers' salaries	200 00
Directors' fees and expenses	137 71
Postage and stationery	21 13
Printing	30 30
Cost of reporting	13 35
Typewriting and preparing annual report	83 56
Expenses *re* tent at Toronto, London and Ottawa in 1896, and at Toronto in 1897	53 32
Office supplies	16 30
Legal expenses	15 00
Miscellaneous	21 70
Total	$1,829 36
Balance in hand of treasurer	2,256 71

Examined and found correct this 17th day of May, 1898.

F. W. Hodson,
Treasurer

John I. Hobson, } *Auditors.*
R. P. Snell,

DOMINION CATTLE BREEDERS' ASSOCIATION.

OFFICERS FOR 1898.

President	John I. Hobson, Guelph.
Vice-President	J. C. Snell, London.
Secretary-Treasurer	F. W. Hodson, Toronto.

Vice-Presidents (representing the different Provinces):

Ontario	Henry Wade, Toronto.
Manitoba	Hon. Thos. Greenway, Winnipeg.
Northwest Territories and British Columbia	W. E. Cochrane, High River, Calgary, Alta
Quebec	H. D. Smith, Compton, Que.
Nova Scotia	C. A. Archibald, Truro, N.S.
New Brunswick	T. A. Peters, Fredericton, N.B.
Prince Edward Island	F. G. Bovyer, Georgetown, P.E.I.
British Columbia	A. C. Wells, Chilliwack, B.C.

Auditor	J. M. Duff, Guelph.

Directors :

Shorthorns	A. Johnston, Greenwood.
Herefords	A. Rawlings, Forest.
Polled Angus	Jas. Bowman, Guelph.
Galloways	D. McCrae, Guelph.
Ayrshires	H. Wade, Toronto.
Holsteins	G. W. Clemons, St. George.
Jerseys	R. Gibson, Delaware.
Guernseys	W. E. Butler, Dereham Centre.
Sussex	Alf. Stone, Guelph.
Ontario Agricultural College	G. E. Day, O. A. C., Guelph.

Representatives to Fair Boards :

Toronto Industrial	G. E. Day, Guelph, and D. McCrae, Guelph.
Ottawa	J. G. Clark, Ottawa, and Jos. Yuill, Carleton Place.
London	R. Gibson, Delaware, and Capt. T. E. Robson, Ilderton.

Committees :

Executive and Transportation : President, Vice-President, Secretary, and Messrs. David McCrae and Arthur Johnston.

Delegates to the Board of the Provincial Winter Fair : G. W. Clemons and John I. Hobson.

DOMINION SHEEP BREEDERS' ASSOCIATION

OFFICERS FOR 1898.

President	D. G. Hanmer, Burford.
Vice-President	A. W. Smith, Maple Lodge.
Secretary-Treasurer	F. W. Hodson, Toronto.

Directors:

Cotswolds	Wm. Linton, Aurora.
Leicesters	A. W. Smith, Maple Lodge.
Hampshires	John Kelly, Shakespeare.
Dorsets	R. H. Harding, Thorndale.
Southdowns	John Jackson, Abingdon.
Oxfords	Henry Arkell, Arkell.
Lincolns	J. T. Gibson, Denfield.
Merinos	W. M. Smith, Fairfield Plains.
Shropshires	R. Gibson, Delaware.
Ontario Agricultural College	G. E. Day, O. A. C., Guelph.

Auditor	J. M. Duff, Guelph.

Representatives to Fair Boards:

Toronto Industrial	F. W. Hodson, Toronto; Jas. Russell, Richmond Hill
Ottawa	Jos. Yuill, Carleton Place.
Montreal	H. D. Smith, Compton. Que.
London	A. W. Smith, Maple Lodge; R. H. Harding, Thorndale.

Committees.

Executive and Transportation: President, Vice-President, Secretary, Messrs. John Jackson and Richard Gibson.

Delegates to the Board of the Provincial Winter Fair: Jas. Tolton, A. W. Smith and F. W. Hodson.

DOMINION SWINE BREEDER'S ASSOCIATION.

OFFICERS FOR 1898.

President	Geo. Green, Fairview.
Vice-President	Wm Jones, Mt. Elgin.
Secretary-Treasurer	F. W. Hodson, Toronto.

Directors:

Berkshires	Thos. Teasdale, Concord.
Yorkshires	G. B. Hood, Guelph.
Chester Whites	R. H. Harding, Thorndale.
Poland Chinas	W. M. Smith, Fairfield Plains.
Duroc Jerseys	W. E. Butler, Dereham Centre.
Tamworths	Andrew Elliott, Galt.
Suffolks	A. Frank, The Grange.
Essex	Jos. Featherston, Streetsville.
Ontario Agricultural College	G. E. Day, O. A. C., Guelph.
General Director	J. E. Brethour, Burford.
Auditor	J. M. Duff, Guelph.

Representatives to Fair Boards:

Toronto Industrial	Thos. Teasdale, Concord; J. E. Brethour, Burford.
Ottawa	Jos. Featherston, Streetsville; Jos. Yuill, Carleton Place.
London	Geo. Green, Fairview; D. DeCourcey, Bornholm.
Montreal	Jos. Featherston, Streetsville; J. M. Hurley Belleville.
Peterborough	Robert Vance, Ida.
Guelph	G. B. Hood, Guelph; Jas. Anderson, Guelph,
Brantford	T. A. Cox, Brantford; Geo. Thompson, Bright
Belleville	J. M. Hurley, Belleville.

Committees.

Executive and Transportation: President, Vice-President and Secretary.

Delegates to the Board of the Provincial Winter Fair: Geo. Green, G. B. Hood and J. E. Brethour.

APPENDIX I.

DIRECTORS' MEETING OF THE DOMINION CATTLE, SHEEP, AND SWINE BREEDERS' ASSOCIATIONS.

The meetings of the directors of the Cattle, Sheep, and Swine Breeders' Associations and of the Board of the Provincial Fat Stock and Dairy Show were held in Brantford, May 23rd, 24th and 25th. The full board of directors was present at each meeting.

REPORT OF THE SECRETARY.

The report of the Secretary was as follows:

The success of the Dominion Cattle, Sheep, and Swine Breeders' Associations during the past year has been most encouraging. The membership of each Association has been raised without the extra effort heretofore found necessary.

The greatest achievement of your directors during the past year was meeting the representatives of the great trunk lines, and laying before them the needs of the farmer regarding the transportation of pure-bred live stock. In reply to our urgent appeals, we received very kind and urgent letters from Sir William Van Horn and other eminent gentlemen interested in railway matters. As a final result of our representations the following circular was issued by the executive officers of each railway operating in Ontario:

Circular No. 241.

(*Cancelling Circular No. 141, April 6th, 1897.*)

To Agents in Canada.

Registered Cattle, Sheep and Swine.

Effective April 1st, 1898. The following arrangement will govern the transportation of registered cattle, sheep, and swine in less than carloads between stations on this company's line in Canada:

When owners sign the usual valuation agreement for ordinary stock, and produce certificate of registration, shipments will be way-billed at one-half regular tariff rates, at the full estimated weights as per Canadian Joint Freight Classification.

Agents will take note of particulars as to the name of animal and age, and keep record of same, showing the information on billing accordingly.

If extra values are declared, the weights and rates will be as per classification for valuable stock, page 45, Canadian Joint Freight Classification No. 10 A., or subsequent issues thereof.

Registered cattle, sheep, and swine may be taken without men in charge, provided owners sign the usual contract releasing the company from liability in consequence thereof.

Give reference to this circular in way-billing.

(Sgd.) General Freight Agent.

To make a comparative statement I submit the following, showing the weight at which pedigreed stock will be shipped under the old tariff and under the new. I have taken one half of the weights instead of the rates :

LIVE STOCK IN L. C. L. LOTS AS FOLLOWS :

	Old rate.		*New rate.*
*Bulls under one year	1,000 lbs. each	1	500 lbs.
*Bulls over one year and under two	3,000 "	1	1,500 "
*Bulls over two years	4,000 "	1	2,000 "
Cattle or horned animals :			
*One animal	2,000 lbs	1	1,000
*Two animals	3,500 "	1	1,750 "
*Three animals	5,000 "	1	2,500 "
*Each additional animal in same car	1,000 "	1	500 "
Calves :			
*Under six months old	500 "	1	250 "
*Over six months and under one year	1,000 "	1	500 "
*Cow and calf together	2,500 "	1	1,250 "
*Hogs, goats, sheep, and lambs, not crated, not taken except by special authority.			
*Hogs, sheep, lambs, or other small animals, in boxes or crates, actual weight		D1.	Taken at half actual weight.
When small animals are allowed to be taken without being crated, the following will be the minimum weights charged :			
*A single sheep, lamb or hog, 400 lbs. each, or actual weight if in excess of 400 lbs			200 lbs., and if actual weight is in excess of 400 lbs. half of the additional weight will be computed.
Each additional lamb, sheep, pig or hog, in same car to same consignee, 200 lbs., or actual weight if in excess of 200 lbs			100 lbs.

In no case shall the charge for less than carload exceed the charge for a carload.

The new rates prevail throughout Canada and will prove a great boon to Canadian farmers now and in years to come. In an official letter regarding the above reduced rates, Mr. John Earls said :

"I understand the arrangement respecting pedigreed stock to be adopted by all railroads in Canada, east of Fort William. I believe, however, that the Government railway system has a special arrangement on its own lines for thoroughbred stock, but there is no doubt the arrangement made by us here will apply on any thoroughbred stock interchanged between the I. C. R. and G. T. R. or C. P. R. companies.

(Sgd.) JOHN EARLS,
Chairman.

Although much has been accomplished in obtaining reductions in railway rates heretofore charged on pure bred animals, yet much remains to be done.

A reduction of fifty per cent. on carload rates, when shipped from point to point in Ontario, also from points in Ontario to points in Quebec or to points in the eastern provinces, that is, the same privileges when shipping carloads as when shipping less than carloads, is yet to be obtained.

Breeders of pure bred live stock should not be compelled to crate shipments of sheep or swine numbering four or upwards, shipped by one person and consigned to one buyer. It is not in the interest of the railway campanies to compel shippers to do this, and it is a needless expense and trouble to both shipper and buyer. Crated animals occupy more than twice, often three times, the room required by the same animals not crated. Instead of being crated they should be fastened off in one end of the car. A case in point. About a month ago I wished to ship fifteen Berkshires ranging in weight from 130 to 400 pounds, a distance of forty miles, via C. P. R. This company insisted on having each animal crated. The time required to crate and the price paid would not allow this, and if the G. T. R. had not taken them without being crated the sale would have been lost. If they had been crated they would have occupied a whole car ; not crated, they were boarded off in one-third of a car

I am glad to be able to tell you that the reduced rates obtained on shipments from Ontario to Manitoba and the west have been extended to cover this year's trade.

FREIGHT RATES ON PURE-BRED CATTLE, SHEEP AND SWINE FROM ANY POINT IN ONTARIO TO ANY POINT IN MANITOBA AND THE CANADIAN NORTH-WEST.

The Canadian Pacific Railway and the Grand Trunk Railway will carry pure-bred cattle, sheep and swine, in car loads, from any point in Ontario and Quebec west of Montreal, at the rate charged on settlers' effects. The charge for a car load of pure-bred stock from any point in Ontario to any point in Manitoba and westward may be learned from any agent of the C. P. R. or the G. T. R., and is published in the pamphlet known as "F. T. No. 45, Canadian Pacific Railway Special Through Westbound Tariff on Settlers' Effects." The rate for a car load of 20,000 pounds from any point in Ontario or Quebec, west of Montreal, to Winnipeg, is $72 per car load ; to Regina, $90 ; to Calgary, $114 ; and corresponding rates to all other western points. (The rates hitherto in force for a similar car load have been—to Winnipeg, $130 ; to Regina, $164 ; to Calgary, $202 ; and these latter rates are now charged for animals not recorded.)

RATES TO BRITISH COLUMBIA.

A car load of pure-bred stock weighing 20,000 pounds, may now be sent to New Westminister and Vancouver, B. C., for $251.

Under the present arrangements it is not necessary to load all the animals composing a car load at one point, *i e.*, part of a car may be loaded at London, part at Woodstock, part at Toronto, or at any other stations on the direct line between the starting point and the destination of the car. No additional charge will be made for a car so loaded except shunting charges, which are $3 for the first stop, and $2 for each subsequent stop.

One man will be passed free with each car load, and he will be returned from the destination of the car to the original point of shipment at one cent per mile, second class. All animals (except those classified as above as settler's effects) sent at the above rates must be pure-bred, and shipped for breeding purposes only ; and a certificate of registration for each animal must be presented to the agent at the shipping point. After being examined by the agent, each certificate will be returned to the shipper.

Parties who wish to ship single animals from any point in Ontario to Manitoba and the west, may do so at car load rates by corresponding with the Secretary of the Associations, and as soon as enough animals to fill a car are offered, the car will be forwarded in charge of a suitable attendant. The price charged for the transportation of such animals will be about $12 per head for cattle when sent to Winnipeg. If sent to Regina, the charges will be about $15 per head ; and to Calgary, $18. Sheep and swine will be carried at proportionate rates.

If not crated, from three to four sheep and from two to six pigs occupy as much space as a bullock. If crated, a sheep or a pig occupies as much space as a bullock and will be charged accordingly. The above charges include feed and attendance.

The above rates are approximate. If the car is full of animals of medium size, the animals may be carried for less than the sum stated ; if the animals are very large and the car not full, the price charged may be in excess of the sums given. Every effort will be made to economize and deliver the animals as cheaply as possible. Each shipper will be required to pay shunting charges necessitated by his shipment. Freight in all cases should be prepaid.

In regard to unloading and the final distribution of pure-bred stock shipped from Ontario to points in the Northwest, the following arrangements have been made with the C. P. R. The car containing stock shall be way-billed through to the farthest point of destination, and may be stopped off at intermediate points on the direct line to unload animals. Two dollars will be charged for each time the car is stopped. That is, a car may leave Toronto containing animals bought by persons residing in or near Winnipeg, Portage la Prairie, Brandon, Regina, Prince Albert and Calgary. This car may be billed through to Calgary, and the car stopped at Winnipeg and animals unloaded. It may again stop at Portage La Prairie and animals again dropped off, so also at Brandon and Regina. The animals intended for Prince Albert would require to be trans-shipped at local freight rates from Regina to Prince Albert; the car would then proceed to Calgary. Two dollars will be charged for each of these stops, excepting the one at Calgary, which is the destination of the car. All animals trans-shipped from a central point over branch lines will be charged local freight rates.

The following circular dealing with local freight rates has been issued to agents, shippers and consignees by the Canadian Pacific Railway lines, west of Lake Superior, Manitoba and Northwestern Railway, and the Great Northwestern Central Railway.

REDUCED RATES FOR SHIPMENT OF THOROUGHBRED CATTLE, SHEEP AND SWINE.

In order to encourage the introduction and exchange of thoroughbred cattle, sheep, and swine in the agricultural districts of Manitoba, Assiniboia, Alberta, Saskatchewan, and British Columbia, shipments will be accepted for carriage, in less than carload lots, at a reduction of 50 per cent. from published tariff rates between stations on all lines west of Lake Superior.

To entitle shipments of aged (full grown) cattle, sheep and swine to this concession in rate, the owner or agent must produce to the shipping agent a properly attested descriptive certificate that the animal is pure-bred, and admitted to full registry in a book of record established for that breed.

Unregistered young stock will be accepted for shipment at the same discount when accompanied by the breeders' statutory declaration, descriptive of the animal and its pure breeding, showing that it is eligible for registration and that written application for a certificate has been made to the secretary of the book of record for that breed.

Agents are expected to examine the stock offered for shipment under the terms of this circular, and to see that the animals agree with the descriptive pedigree or statutory declaration provided by the shipper.

Way-bills for aged stock (full grown) must give a desciption of the animals, the number of the certificate, name of herd-book, etc.

Way-bills for unregistered young stock must give a description of the animals, and bear notation that breeder's declaration was produced and is on file with the agent's copy of live stock contract.

The owner or agent will be carried in charge on the same terms and conditions as prevail in the handling of ordinary stock.

RATES CHARGED ON ANIMALS SHIPPED FROM ONTARIO TO EXHIBITIONS IN MANITOBA AND THE WEST.

The C. P. R. and G. T. R. will carry animals from Ontario to the Northwest for exhibition purposes at the reduced rate per carload, and will return the same at one-half the going rate. For instance, a shipment to Winnipeg would be charged $72. If returned to the original point of shipment the rate would be $36 in addition to the $72, total $108, from any point in Ontario west of Montreal to Winnipeg. Corresponding rates to other points.

An attendant will be carried free with each carload.

Complaints have recently reached my office from breeders residing near outlying stations in the Province of Ontario that they cannot obtain the privileges outlined in this circular. The complaint sometimes has been that the reduced rates given herein were not allowed by certain station agents, or that the reduced rates for carrying pure-bred animals are not known and not granted by certain agents. In every case of this sort that has been brought to my notice I have appealed to the railroad authorities, and in every case I have obtained the required rebates. Hereafter if any shipper of live stock fails to readily obtain the privileges herein outlined, if he will communicate to me by letter, telegram, or telephone, I will have no trouble in having the matter immediately set right. I have sometimes found, however, that it was the fault of the shipper in not stating that the animal was pure-bred, and not producing the registration certificate at the time of shipping.

Further particulars may be had by applying to the general or local freight agents of the C. P. R. or the G. T. R., or to the Secretary of the Live Stock Associations.

The trade in pure-bred stock has been most gratifying. The prices asked and obtained for all sorts is from 25% to 100% higher than a year ago. The advance in the price of pure-bred cattle has been very marked. Notwithstanding the improved prices the demand has in most cases exceeded the visible supply. In fact, the demand has been stronger during the last ten months than at any other time during the past decade. In Ontario the improved railway facilities have proved of great value, not only to the breeders of pure-bred animals but to the country at large. I am sure the announcement of a 50% reduction between points in Ontario and the east made to-day for the first time at a public meeting, will meet with hearty appreciation. I am sure the live stock men of this Province and of Canada generally, are very grateful to Sir Wm. Van Horn and the members of his staff for the very kind and practical interest they have taken in this matter, so important to the present and future welfare of Canada. I wish to especially to mention in this connection Mr. G. M. Bosworth, Freight Traffic Manager of the C. P. R., whose assistance and advice have been of great value to the executive when dealing with the important question of transportation charges. We have also found Mr. Arthur White, Division Freight Agent of the Grand Trunk, very prompt to meet and forward the wishes of your representatives. His gentlemanly and courteous manner, make it a real pleasure to do business with him and his department.

AMERICAN CUSTOM REGULATIONS REGARDING PURE-BRED STOCK BETWEEN THE UNITED STATES AND CANADA.

These regulations are best explained by the following correspondence between the Hon. Sydney Fisher, Minister of Agriculture for the Dominion, and Dr. D. E. Salmon, Chief of the Bureau of Animal Industry, Washington, D. C.

OTTAWA, March 30th, 1898.

Dear MR. SALMON :— I have just received a letter from one John Will, Fort Covington, N. Y. who has been importing some Canadian Ayrshires into that State, complaining that although they are all properly registered in the Canadian Herd Books he has to pay duty on them as though they were not thoroughbred stock.

Our people here, I think, have been somewhat negligent in not progressing in this matter, but it would facilitate their work if I could receive a letter from you stating just what would be required to secure the recognition by your Customs Officer of the registration in Canadian Herd Books. My understanding of your views at the time I was in Washington is this : that if the American Stock Associations are accepting registration in the Canadian Herd Books of the same breed as sufficient to entitle the animal to immediate registration in their Herd Book without further investigation, then the Government of the United States would accept the Canadian registration as complete proof of pure breeding.

It seems to me this is only reasonable. Surely the Government cannot be expected to ask more proof than the Stock Associations themselves require. The question of after registration in the United States stock books is one which concerns the buyers of the stock and the Association in your country, and in which we are not really concerned.

The greatest difficulty is in consequence of the detention and trouble at the frontier. Men come over here and buy two or three or four or five animals and want to take them right back themselves. If they are required to be registered in the American stock books they cannot do this, as the correspondence perhaps would take two or three weeks.

If my above outlined understanding concurs with your own and you would be ready, upon receiving the the information necessary, to instruct your Customs officer on these lines, I would immediately find out through our own Stock Associations what Herd Books would be qualified in this way, and inform you.

I am,
Yours sincerely,

(Sgd), SYDNEY FISHER.

DR. D. E. SALMON,
Chief of Bureau of Animal Industry,
Washington, D. C.

U. S. Department of Agriculture,
Bureau of Animal Industry,

Washington, D. C., April 8th, 1898.

SIR —Referring to your letter of the 30th ultimo, the Custums regulations of the United States for the importation of animals for breeding purposes are arranged to facilitate the importation of stock in cases such as that to which you refer. It is provided that if the certificate is not at hand at the time of arrival at the border, duty on the animal is estimated and deposited, and the animals delivered to the importer, who may within ten days file a written stipulation with the Collector to produce the proper certificate within six months from date of entry. Upon the production of the certificate in due form within six months of the day of entry, the amount deposited will be refunded to the importer. This arrangement seems to me to be sufficient to accommodate those who desire to import Canadian Ayrshires from Canada into the United States. During the six months the importer can forward his certificates of pedigree to the Secretary of the American Ayrshire Herd Book who will pass upon them, and if the cattle are pure bred and entitled to registration in the Ayrshire Herd Book, then he will issue certificates to that effect to be sent to the Collector at the port of entry. A similar arrangement exists for animals of other breeds. As noted in your letter, this Department considers that the stock associations are competent and able to a pass upon the pure breeding of animals, and those which are of a recognized breed and duly registered in the book of record established for that breed, can be imported free of duty, while those which are not pure bred are excluded.

Yours respectfully,

(Sgd) D. E. SALMON,
Chief of Bureau.

HON. SYDNEY FISHER,
Minister of Agriculture,
Ottawa, Canada

A great many store cattle still continue to be exported to the United States. If closer trade relations existed between Canada and our neighbors to the south, a very strong American demand would rapidly develop for Canadian bred cattle, sheep, swine and poultry. Already American packers have discovered that if they wish to secure the most profitable British bacon market they must buy and cure Canadian hogs. Canadians everywhere should unite their efforts to produce "The Greatest Quantity of the Best Quality" in all lines of stock breeding. The Western ranches can produce meats cheaper than we in Ontario. Our hope is in producing animals of superior quality, not such as would please the buyers and consumers of twenty years ago, but such as are required to meet perfectly the demand of to-day. Let us do everything in our power to find out just what the consumers in Canada, the United States and Great Britain demand, and then do our utmost to supply this demand with the best possible products. Doing this we will reap satisfactory returns. If we neglect to learn the requirements of the best trade, or fail to supply what is demanded in the best markets, our products will surely be driven out of the most desirable markets and even our home market will not be assured to us. Ontario's hope is that she shall produce articles of the highest grade.

Records.

A satisfactory increase has been made in the number of registration certificates issued for pure-bred swine in 1897. The registrations for 1896 and 1897 are as follows:

	1896.	1897.
Berkshires,	1,287	1,471
Yorkshires,	460	716
Chester Whites,	184	405
Poland Chinas,	237	329
Tamworths,	193	312
Duroc Jerseys,	69	202
Suffolks,	32	25
Essex,	43	..
	2,505	3,460

(Sgd.) F. W. Hodson,
Secretary.

The Executive Committee of each Association was appointed a Transporation Committee to act on the suggestions of the Secretary regarding additional concessions to be asked from the railway companies.

THE PROVINCIAL WINTER SHOW.

Each department of the rules and regulations and prize list of the Provincial Winter Show was carefully considered and revised when thought necessary in the best interests of the public.

Dates for Holding the Show.

It was unanimously decided that the show be held one week earlier than usual, and on Wednesday, Thursday and Friday instead of on Tuesday, Wednesday, and Thursday. The show will be held at Brantford on November 30th, December 1st and 2nd. There will be as usual a large open meeting on the first night of the show, but of the Dominion Live Stock Associations only, the Swine Breeders' Association will hold its annual meeting at this time. The Cattle and Sheep Breeders' Associations have given up their evenings to the American Oxford Breeders' Association and the American Leicester Breeders

Association, who will hold their annual meetings in Brantford on the evenings usually occupied by the Cattle and Sheep Breeders' Associations. In 1899 it is expected that the American Shropshire Record Breeders' Association will hold their annual meeting at the time and place at which the Provincial Winter Show is held.

RULES AND REGULATIONS.

On motion it was decided that the dates up to which entries may be received by the Secretary, should be strictly adhered to. The rule governing this reads as follows: "Entries should be received on or before November 20th. Entries received between November 21st and 25th, inclusive, will be charged double fees. No entries will be received after November 25th." Owing to serious complaints by exhibitors of dairy cattle, it was thought wise to prohibit dogs entering the building.

The entry fees are as follows, but no entry fee will be charged for special prizes Cattle, $2 per entry; swine, 50 cents per entry, sheep 75 cents per entry.

A change was also made in the date to which the ages of animals will be computed. These dates are now as follows: Fat cattle, September 1st; sheep and swine, December 1st; dairy cattle, August 1st. Last year the ages of all animals were computed to December 1st.

PRIZE LIST.

FAT CATTLE. The only change made in the prize list in the fat cattle department was in Class 4, Sections 5 and 6 for grade "Heifer, 2 years and under 3", and "Heifer, under 2 years." These prizes now are 1st, $20; 2nd, $15; 3rd, $10, instead of 1st, $15; 2nd, $10; 3rd, $5.

SHEEP. In the classes for Cotswolds, Lincolns, Leicesters, Oxfords, Shropshires, and South-downs, the prizes will be as follows:

Sect. 1. Ewe, 1 year and under 2: 1st, $12; 2nd, $9; 3rd, $5.
2. Ewe, under 1 year: 1st, $10; 2nd, $8; 3rd, $5.
3. Wether, 1 year and under 2: 1st, $12; 2nd, $9; 3rd, $5.
4. Wether, under 1 year: 1st, $10; 2nd, $8; 3rd, $5.
5. 3 Wethers, under 1 year: 1st, $12; 2nd, $9; 3rd, $5.
6. 3 Ewes, under 1 year: 1st, $10; 2nd, $8; 3rd, $5.

In classes for Dorset Horns and Merinos, and Hampshires and Suffolks, the prizes will be as follows:

Sect. 1. Ewe, 1 year and under 2: 1st, $10; 2nd, $8; 3rd, $4.
2. Ewe, under 1 year: 1st, $10; 2nd, $8; 3rd, $4.
3. Wether, 1 year and under 2: 1st, $10; 2nd, $8; 3rd, $4.
4. Wether, under 1 year: 1st. $10; 2nd, $8; 3rd, $4.

In the class for Grades and Crosses "Sheep, under 2 years" will read, "Best Ewe or Wether under 2 years." Otherwise the prizes in this class remain as last year.

SWINE. In all pure-bred classes "Barrow, 9 months and under 15" was struck out, and the section for "Sow or Barrow under 6 months" was divided into two classes, one for "Sow, under 6 months" and the other for "Barrow under 6 months," the prizes to be 1st, $10; 2nd, $6; 3rd, $4.

In the class for Grades and Crosses, "Barrow, 9 months and under 15" and "Sow, 9 months and under 15" were struck out, and sections added for "Sow, under six months" and "Barrow, under 6 months", prizes to be 1st, $10; 2nd, $6; 3rd, $4. Instead of giving a sweepstake prize it was decided to give a prize for the "Heaviest Sow or Barrow at the Exhibition, any age."

Bacon Classes. The following bacon prizes will be offered subject to the rules appended:

Sect.				
1.	4 Improved Berkshires....	1st, $25.	2nd, $15.	3rd, $10
2.	4 Improved Yorkshires	"	"	"
3	4 Tamworths	"	"	"
4.	4 Chester Whites	"	"	"
5	4 Poland Chinas....................	"	"	"
6.	4 Duroc Jerseys	"	"	"
7	4 Suffolks or Essex	"	"	"
8.	4 Grades or Crosses	"	"	"
H. R. H. Prince of Wales' prize:				
9.	2 Best dressed hogs to be brought to the show alive and killed the second day of the exhibition	"	"	"
10.	4 Best bacon hogs, any breed........	"	'	"

Provision for killing have been completed and arrangements have been made whereby the animals competing in Section 9 can be sold in Branford for the highest market price for dressed pork.

Rules.

1. No animal deemed unsuitable for bacon purposes by the judges shall be awarded a premium, but no premium shall be withheld merely because there is no competition.

2. Hogs shown in any other class are eligible to compete in this class.

3. Other rules governing the swine department will apply to the bacon class.

N. B. Hogs which meet the pork packers' requirements weigh between 160 and 200 pounds. They are long in the body, deep in the side, narrow in the shoulder, a small head, and hams in proportion to the body, and not too fat; the ideal weight is between 170 and 180 pounds.

Dairy Cattle.

The following committee was appointed to go carefully over the rules, regulations and prize list of the dairy department: G. W. Clemons, G. E. Day, Prof. H. H Dean, W. E. Butler, and H. Wade, with power to add to their number. A meeting of this committee was held on Saturday, June 4th.

On account of the amount of work in figuring out the results of the dairy test, it was decided that the prize money in this department need not be awarded for one week after the show is held.

Special to Exhibitors Coming a distance of over 100 miles.

Any exhibitor requiring to bring his stock over one hundred miles from any point in Ontario, will be entitled to a rebate, equal to the freight charges on his shipment for the distance it was carried over one hundred miles. In order to avail himself of this privilege an exhibitor must write the secretary at least three weeks before the show is held, giving full particulars as to the point of shipment, the distance from the show, and the carrying line The exhibitor must also at the time of the show furnish a receipt showing the amount paid, the point of shipment, and the number and kind of animals included in the car. No rebate will be allowed unless the above conditions are complied with.

Gentlemen in Charge of Judges and Rings.

Cattle: John I. Hobson and C. W. Yapp.

Sheep: Jas. Tolton and John Jackson.

Swine: G. B. Hood, F. A. Metcalf, Brantford; and S. Suddaby

Dairy: G. W. Clemons.

JUDGES.

Cattle:

Thos. Crawford, M. P. P., Toronto, and Jas. Smith, Brantford. Reserve, T. G. Colwill, Whitby. Referee, J. T. Gibson, Denfield.

Sheep:

Cotswolds: Hardy Shore, Glanworth; Jas. Gaunt, St. Helen's. Reserve, E. Parkinson, Eramosa.

Lincolns: E. Parkinson, Eramosa; Jas. Gaunt, St. Helen's. Reserve, Hardy Shore, Glanworth.

Leicesters: Jas. Gaunt, St. Helen's; E. Parkinson, Eramosa. Reserve, Hardy Shore, Glanworth.

Shropshires: Geo. Allen, Allenton, Ill.; Henry Arkell, Teeswater. Reserve, J. C. Duncan, Lewiston, N. Y.

Southdowns: J. C. Duncan, Lewiston, N. Y.; Geo. Allen, Allenton, Ill. Reserve, Henry Arkell, Teeswater.

Oxfords: Henry Arkell, Teeswater; J. C. Duncan, Lewiston, N. Y. Reserve, Geo Allen, Allenton, Ill.

Horned Dorsets and Hampshires: Same as Oxfords

Grades: Geo. Allen, Allenton Ill.; Hardy Shore, Glanworth. Reserve, Henry Arkell, Teeswater.

Sweepstake: Jas. Tolton, Walkerton.

Swine:

Chester Whites, Poland Chinas, Duroc Jerseys, and Grades: J. G. Snell, Snelgrove; G. B. Hood, Guelph. Reserve, C. W. Yapp, Brantford.

Berkshires, Yorkshires, Suffolks and Essex, and Tamworths: Thos. Teasdale, Concord; W. H. Jones, Mt. Elgin. Reserve, G. B. Hood, Guelph.

Sweepstake prizes: to be awarded by the acting judges in both classes.

Bacon Sections: Jas. Leach, of the Wm. Davies Packing Co., Toronto, and Chester Fearman, Hamilton. Reserve, C. W. Yapp, Brantford.

Dairy:

G. E. Day, Guelph, in charge of the dairy test; and G. E. Day and J. C. Snell, London, judges for conformation.

Reduced passenger and freight rates have already been arranged for from all points in Ontario. The prize list had been increased by about $300, and it is expected that the Show will be the best that has yet been held.

PUBLIC MEETING.

At the public meeting held in the Opera House, Brantford, on the evening of 7th December, Mr. Thomas Elliott, Mayor of Brantford, occupied the chair. There were a large number of ladies present, and the meeting was packed to the doors. Telegrams regretting inability to attend were read from the Premier, Hon. A. S. Hardy, Mr. A. F. McLaren, M. P., Stratford, and Mr. W. C. Edwards, M. P., Rockland.

In the regretted absence of Hon. Mr. Hardy, Mayor Elliott welcomed the visitors to Brantford in the following words:

THE MAYOR'S ADDRESS OF WELCOME.

Mr. Chairman,—It affords me a great deal of pleasure to be here this evening and tender a hearty welcome, on behalf of the citizens of Brantford, to members of the Provincial Fat Stock and Dairy Association of Ontario.

It is now about two years since Ald. Foulds, Mr. Hately and others interested themselves in the matter of trying to secure the holding of the show in Brantford. There was considerable opposition met with, one of the leading arguments being that Guelph was the most suitable place for the show; in fact the good people of Guelph having had the show so many years in succession they had come to look upon it as their property and had forgotten that it was a Provincial Show and supported by a Government grant which entitled other places to have an opportunity of securing this educator of the people of the Province. It is an educator and instructor, Mr. Chairman, and I am sure that the farmers of the County of Brant and the people of our fair City of Brantford will have a great deal better knowledge about the fat stock and dairy resources of this beautiful Province of Ontario than they had previous to the holding of the show in our midst.

I am sure that it will be the means of urging some of our farmers to greater efforts in the future, so that they may be able to get the best results from their farming and stock raising. Brant County has not been behindhand in the past in the way of having some among its residents who have taken an active interest in the matter of raising the best stock.

The Bow Park Farm, originally owned by the late R. R. Bown and at a later period, owned by the late Hon. George Brown, and under the management of the late John Hope, and is now being run as a dairy farm by Mr. J. M. Shuttleworth, has a reputation that is not confined to Canada alone. It has been the home of some of the best blood in the shorthorn race of cattle ; and the horses, as well as the sheep and pigs that have been found there, have proved a great benefit to the country at large.

The late Hon. David Christie also contributed his share towards advancing the improvement of the stock of our county, and we have many with us to day who are to be found in the front ranks, securing prizes against all comers I refer to such names as the late D. Perly, Hanmer, and others who are identified with sheep breeding and the Messrs. Douglas, Shaw, Captain Milloy and others who are identified with cattle raising ; then we have Messrs Brethour, Cox and others who have gained a wide reputation as breeders of the highest class of swine ; and such men as the late Humphrey Davis and Cope Stinson have done much for the county by way of improving the horse.

So you see, Sir, that Brant County has claims to have the Fat Stock and Dairy Exhibition here, and we will try and make it pleasant for every one of the members while they are here and will if possible, induce them to return.

I am pleased to see you in the chair, sir. It is gratifying to us to have the Minister of Agriculture for this noble Province here this evening and to have him occupying the position of chairman at this time.

We have done all we could in the way of securing a suitable building for the show, as well as offices for holding the meetings of the members of the different societies represented, and I can testify to the fact that Ald. Foulds, Councillor Yapp and Mr. Shuttleworth have done all they could to make things comfortable. I hope they will meet with the approval of all interested.

We want you all to enjoy yourselves while here, and when you return to your homes to carry away with you such pleasant recollections of your visit to our city that you will all vote for Brantford having the show again, and all want to come to it.

We are proud of our city and think Guelph is not in it with us. There are many sources of attraction to the visitor. Our manufacturers will welcome you ; then we have the Brant Monument in the centre of our pretty little park ; the Bow Park Farm where you can see the milking machine at work, and many other attractions.

Let me say to you all again : Enjoy yourselves ; have a good time,—Brantford welcomes you.

ADDRESS OF PRESIDENT HOBSON.

Mr. Chairman, Ladies and Gentlemen:—I deem it a privilege and honor to address such a splendid gathering as there is here to-night. In reply to the address of welcome, allow me to say, as President of the Fat Stock and Dairy Club and President of the Dominion Cattle Breeders' Association, that we fully realize and appreciate the hearty welcome given us. We thank you most heartily for what you have done to enable us to have these pleasant and profitable meetings. Some of us here to-night know what it means to bring about successful meetings and exhibitions of this sort; it is not done without great effort, and the officers and exhibitors desire us to thank you for what you have done in the way of co-operation.

Reference has been made to the Guelph Club, and perhaps there has been some little friction; but nevertheless the feeling of the Guelph Club were in hearty sympathy with what is going on here this week, and the members ask me through their board of directors to extend their hearty wishes for the success of this exhibition. Perhaps it would not do to go so far as to say that it is the best all round exhibition of the sort held on the continent, but it would certainly be difficult to surpass it.

It is a splendid sight on occasions of this sort to see such a representative gathering. This is as it ought to be, because these associations and exhibitions have been productive of great good in the past, and there is no doubt they will continue to be in the future. We are very pleased to see here to-night our Minister of Agriculture for the Dominion and also for our Province. Then we have among us some prominent representatives of the industrial world, men who have made themselves famous the world over as manufacturers. During my summer's travels, it pleased me to see the names of our Brantford men everywhere, and I was told that they were more than holding their own against their competitors.

It went to prove what I think we may say without boasting that, taking the best type of our Canadians, it matters not whether they are agriculturalists, manufacturers or engaged in commercial pursuits, they can hold their own against the men of any land.

We have here to-night agriculturists who have no superior in any country; we have skilled agriculturalists, men who have studied the science as well as the practice of agriculture. As competition becomes keener in the markets of the world it becomes more and more important that farmers should thoroughly equip themselves and become scientific farmers, because the day has gone by when a farmer's success could be measured by his powers of endurance. The day has come when science is going to be a more important factor than it has ever been in the past.

It is now time for me to close, and I again thank you most heartily for what you have done to make our visit pleasant and instructive, and I can assure you that I shall have many pleasant remembrances of this good city of yours. (Applause.)

ADDRESS BY MR. T. H. PRESTON.

Mr. T. H. Preston, President of the Southern Fair Board, added his welcome to that of His Worship, the Mayor. He said:

Mr. Chairman, Ladies and Gentlemen:—You, sir, have extended the glad hand of welcome to our visitors on behalf of the people of Brantford. My apology for being here is that in my official capacity as President of the Southern Fair Board, I am supposed to represent the stock and dairy interests of this section, interests which will be much benefited by the holding of this show in our midst. We do not pretend to be the Smithfield of Canada, but at the same time we do claim to be the centre of a no mean agricultural and stock-raising section. Brant County stockmen have more than held their own against all comers in the great competition. Even in the competition for office

I find they have done the same, having given you one president, one vice-president, and a secretary-treasurer. If we fall behind in some lines of stock-raising, there is one line we can beat all Canada in, and that is statesmen. Had he been here to-night I should have referred to Hon. A. S. Hardy, Premier of Ontario. as a sample of what we can do in that line. I do not know how you would classify him, but as he is the head of a Government committed to the curtailment of the sale of intoxicating liquors, I suppose you might refer to him as a "Shorthorn." (Laughter.)

A short time ago I received from a gentleman some advice as to the live stock section in a prize list. It was this: make your first prize as big as you can; as to the others it does not make much difference, because every stockman is sure that his stock will take the first prize, and he never looks at anything else. This is an indication of the spirit by which Canadian stockmen of to-day are actuated. They are determined to have the best and nothing but the best, and are convinced that their breeds are superior to all others. It is in this spirit that our twin Ministers of Agriculture are seeking to direct us, so that our stockmen may not only think they have the best, but actually have the best it is possible to obtain. It is along this line that you are conquering and must conquer the British markets, and make of Ontario an agricultural Klondike, and your pocket books fatter and thicker than your own live stock.

In agriculture, history is moving rapidly forward. Old things are passing away. Never were the principles of farming so well understood as they are to-day; and yet it seems to me that we are on the eve of even greater changes than we have seen. This is an age of electricity, and while electricity has been adopted for almost everything it has done nothing for agriculture. But your turn will come, and when electricity comes to your aid, when the electric trolly opens up communication in the rural sections, it will make no difference to you whether you live on the land or in the centre of the town or city. If you choose to live in the country, as you will likely do, because of its purer air and greater freedom, you will have rapid transportation for yourselves and your products to the nearest market.

I am satisfied if you look back over the way you have come and have regard to the present conditions, you have reason to thank God and take courage. I am satisfied that if you look for the bright spots on the horizon as they are to-day, you will admit that taken altogether the future has for you in this country, probably more than for any other class, a beckoning hand.

I have nothing further to say than this "Better used you canna be; will ye no come back again?" (Applause.)

ADDRESS IN REPLY.

By Hon. John Dryden, Minister of Agriculture of Ontario.

Mr. President, Ladies and Gentlemen:—I regret that I was not present to hear the words of welcome to which I am to reply, but the Secretary has been kind enough to put into my hands some little memoranda and I have looked it over. I am very glad to be permitted to appear on this occasion not so much as head of the Department of Agriculture in this Province, but as one of the class specially represented at this Provincial Winter Exhibition. What I have to say I want to say from the point of view of those engaged in stock-raising. I am sure we all appreciate the words of welcome and the sentiments that have been given expression to on this occasion. But there is something else we appreciate quite as much, and that is the effort put forth by the city of Brantford to provide suitable accommodation for this show during 1897.

I have had the privilege of visiting this exhibition for an hour or so, and the arrangements appear to be very complete, and whoever has had charge of it deserves great credit. There is another thing that is apparent to those of us who come from a distance, that is the enthusiasm which seems to be manifested by all those who have had to do with the work in this city. Then the attendance has been very gratifying ; I do not know that any one could desire a better. It was not always so at other exhibitions. It is a very desirable thing for the citizens of a city like Brantford to mingle with those living in the country who bring the products of their skill and industry to this exhibition. It is a good thing for us occasionally thus to mingle together. It does us both good, because whether we have ever done it before or not, we have learned this Jubilee Year to forget that we are farmers, or mechanics, or tradesmen, or professional men, in the greater, the grander thought that now prevails in this country, that we are Canadians. Whether we are living and carrying on our work in the city or in the field, we realize that we have equal interests in a common country, and that we have the same inspiration to do loyally what we can to build up and extend the the trade and production of this our country. We who live on the farms do not always look quite so trim and neat as some would desire we should, nor when we come to the city is our walk quite so sprightly as you might expect seeing that we have so much practice in that line, nor are our garments always of the most fashionable style, but what I want to say is that underneath that old fur cap or common straw hat you will find quite as much solid common sense as you will find in a four inch collar or under a stove pipe hat. Underneath these rough exterior garments, which cause people sometimes to say " He is only a farmer, " remember that there beats a heart just as true, just as earnest, just as determined to overcome every obstacle and win in the industrial race, as you will find in the town or in the city. It seems therefore to be a desirable thing to bring the best of those who live on the farms to our cities to mingle with those engaged in other callings and realize that we are all citizens of a common country and are all engaged in an effort to carry this country forward.

I want to say that I have had the privilege of going through some of our great manufacturing establishments. A stranger who comes from the country and goes through one of these establishments cannot but marvel at what he sees. He cannot but wonder at the skill exercised in constructing the various machines he sees in operation. Some inventive genius has been long at work in designing it. But I should like to say that right here before you are men who have been engaged in even a higher type of production. In that workshop you will find that every workman is working according to a certain pattern placed before him ; the machinery he employs is so constructed as to produce the same result in each instance ; no great skill is needed. But here are men who are engaged on the farms in producing a different sort of thing, something that requires a great deal more skill and genius. They are dealing with life itself, undertaking to harness and control the subtle laws of nature, and compelling them to produce exactly the type of article they want. This is no mean occupation. Then when we have succeeded in getting exactly the type of animal required for the market, we find that the market has changed and that we must adapt outselves to changed circumstances. Therefore these men must set about to produce a different article to what they had produced before. Let me point to the great improvement in the quality of the meat produced in Ontario since the old days when you had enormous oxen weighing a ton and a half, the idea being, to make them as big as possible ; and enormous hogs which could not be got into an ordinary wagon. But we have come now to consider that these are mere lumps of tallow and lumps of lard, and nobody wants them. So the farmer and the stock-breeder has set himself to change all this, and to-day if you go through this show, you will find the types are entirely different in many respects to what they used to be. Now people who live in the cities and towns demand that they should be given lean meat instead of fat. So the farmer sets to work to produce this. If you want to know how well he has succeeded go and see this exhibition.

This all requires a great deal of skill and thought. The men who produced these animals were not like the factory hands with a pattern before them. Their ideals were in their minds, and they worked at them for years before accomplishing the desired results. A great man in England once said that he could find a hundred men fit to be prime ministers before he could find one qualified to undertake a work like this. In this Province we have proof that we have hundreds of men who are able to do exactly what I have suggested. I am looking into the face of a man in the audience just now who has his ideal and is working it out and has been for years, and has won at our exhibitions on this account. Whether we have won that success or not, let the records at the Great Chicago World's Fair show, and the records in the markets of the world, show. So I say, you welcome in your city, men who deserve recognition at the hands of our people men of no mean attainments in this direction.

Those engaged in this work as in all agricultural work do not receive sufficient remuneration for their effort. If I had my way and wanted to build up a great nation, I would make agriculture the most attractive and remunerative industry in the whole country, a great deal more so than it is to-day. It has its attractions in spite of the discouragements, but it will never have that attraction I should like to see it have until the remuneration is greater than it is now. A man does not like to do something for nothing. A man who labors and puts forth his best effort and finds no proper remuneration loses the interest he should have in his business. I am glad to see things are improving in this regard. I notice that Mr. Hobson referred to this last night before the Cattle Breeders. No doubt things are improving, but there is room yet. I should like to say to the citizens of Brantford, do not begrudge what the farmer gets for anything he produces. He will not get any too much. One way to make things improve in this country is by steadily improving the quality of our products. There is no other way than this to capture the remuneration we ought to have. I am proud of what the Province has done in this regard. Ontario is to-day doing more towards the education of those engaged in agriculture, and producing better agricultural products perhaps, than any similar piece of territory, on this wide earth. This is a great deal to say, but I am proud of the Province in this regard. We can get to the front in no other way than by education. This exhibition is one of the educational means we are using towards this end. Let a young man come to the exhibition here, and he will find examples of what it is most desirable to produce. Then we are developing our Live Stock Associations and Farmers' Institutes which tell him just how to go to work to produce it. There is no reason why a farmer should be ignorant in this country.

We want, all of us, to put forth a united effort ; do not let us separate ourselves into classes, but whether we are manufacturers, tradesmen or farmers, let us work together. Remember that we as farmers are operating a mine that never runs out, but ought to get better and better as the years go by. (Applause.)

Mr. Arthur Johnston, President of the Shorthorn Breeder's Association, was then called upon. Mr. Johnston said that he had not come prepared to make a speech, but in a few words referred to the interest taken in stock-raising by men of wealth and position in Great Britain, and advocated the wealthy and influential men of this country investing their means in agricultural pursuits.

ADDRESS BY HON. SYDNEY FISHER.

Hon. Sydney Fisher, Dominion Minister of Agriculture, on coming forward was received with applause. He said :

Mr. Chairman, Ladies and Gentlemen :—I want first to thank the officers of the organization who have arranged this meeting for the very kind invitation by which I was enabled to pay this visit to your city. I want to congratulate the city on the fact that this year they are holding the Fat Stock Show here. It is the first time for some years, I believe, that this exhibition has been held outside the city of Guelph. I want to congratulate the officers of the organization, and the people of Brantford, on the magnificent success which has attended this new departure in their fair city. It was indeed a now departure, because people had almost begun to think that of necessity it must be held in the city of Guelph, and it was thought to be impossible to remove it without courting failure; but what I have seen to-day, the gathering here to-night, and the men I have met here, have shown me clearly that this show can be made a magnificent success in the city of Brantford, and I want to congratulate the city and the officers on this fact

It was my good fortune last year to come to this city to speak to another gathering of farmers—that of the Western Dairy Association. I look back with pleasure and satisfaction on the opportunity I thus had of meeting with the farmers of this part of the country, and the people of this city, and it was again a pleasure to be able to come into your midst on this occasion. I was at the Fat Stock Show last year, and during that same winter I took occasion to visit most of the farmers' conventions of the great Province of Ontario. I felt it was a duty my position called upon me to perform. I felt that it was a pleasure and privilege I could not personally forego, because coming new into the office I had the honor to occupy, I felt that in no way could I obtain a better insight into the duties and requirements of that office than by meeting with the leaders of the stock-raising and agricultural population of this Province. I was fortunate in this, and I look back with a great deal of pleasure to those meetings, and trust that this winter I am going to have a similar privilege.

But I want just for a moment to look back over the year that is past; this Jubilee Year, which I think we Canadians may contemplate with complacency, with exultation, because in this year more than ever before the Dominion of Canada and the people of the Dominion have become known to the world, and appreciated in the world. It was our duty and privilege as loyal Canadians and members of this great Empire to send our representatives to London, the centre of our Empire, there to take part in the great and glorious pageant held in honor of the sixtieth anniversary of the Queen's reign. We did that out of the fulness of our hearts, desiring to do homage and honor to our Queen, without any thought of future reward, but indeed we have been repaid ten fold, for the reason that Canada has thus been brought before the world in a new sphere and a new light and is known better than she ever was before. It is true there are other things that have contributed to this effect—the development of our great mining resources; the discovery of gold in such enormous quantities in our far Northwest—these things have attracted the people of the world, and perhaps the cupidity of a large proportion. All these things have contributed, and will result, I believe, in drawing people here. You and I know that with our great and fair Dominion spread over hundreds and thousands of square miles, with all its varied resources and great capabilities—we know that what we need in this country is population, and there is perhaps nothing that will attract it so rapidly as the discovery of gold. We know that California sprung into being immediately after the discovery of gold there. Australia by reason of the gold discoveries attracted the attention of Europe, and for a long time we were completely eclipsed, but I am glad to know that now the attention of the world is drawn to us. In the meantime our people by their industry and careful attention to their own business have been laying the foundation of an Empire which after it has become known will attract people to come here and be happy and prosperous in our country.

But there are other benefits that have resulted. While heretofore we have been sending large quantities of the food products of this country to the Old Land, and have had a very fair and profitable commerce therein, to a large extent, many of these products have not been sold to the consumers in the Mother Land under the name "Canadian." We have not reaped the reputation we deserved. But to-day all that is changed, and at the present time in the Old Land you have simply to mark a thing as "Canadian" to make people ask for it. You have simply to let a man be known as a Canadian to have people crowd around him and welcome him. We must take advantage. I have frequently said to people, "If the British will only once taste our products, they will ask for more," because I believe and know that our Canadian products in themselves are good; that they are honest; that they are what they represent themselves to be and what we are representing them to be. We have no filled cheese in this country; we have no oleomargarine in this country. If we send beef there, it is beef of the best quality; if we send flour, the flour is of the best quality. This will make our reputation in the Old Land, and I am satisfied that after the British public once begin to eat our products they will decide that they are very good, that they have never tasted anything better, and will ask for more and more of them. We know that in Britian they import hundreds of millions of dollars worth of food products. Up to the present time we have sent but a small proportion. We have almost an unlimited opportunity of expansion, which means that we have an almost unlimited opportunity of drawing into our own pockets the wealth contained in the Mother Land, which is poured out year after year for the food necessary for their teeming millions.

I spoke of the great gold discoveries in our North West, that is certainly a great attraction and will bring many people here, but I have far greater confidence in the golden wheat fields and the agricultural wealth, and am satisfied that the gold thus raised will be far more satisfactory and lasting in its benefits.

A good deal has happened in our country during this year. When I met the farmers of Ontario last winter we were at what we now know to have been the end of a rather serious depression in agriculture in this country. Our crops, most of them, were low in price : our stock was not in demand ; we had a glut in our markets. Our butter and cheese were fair in price, but nothing extra ; our wheat was low in value. But these conditions have during this Jubilee Year almost altogether disappeared. To-day the farmers of Canada are hopeful, they are receiving good prices for their wheat. This season has on the whole been a prosperous one for our dairy interests. To-day there is a large demand for our stock. Our stock raisers can hardly meet the demand for pure-bred stock for breeding purposes. This is surely a subject of congratulation, and I am glad to know that at all events in reference to this stock, I have been able, in my capacity as Minister of Agriculture, to do something towards promoting this state of affairs. At the Live Stock Show last winter I arranged with my friend, Hon Mr. Dryden, to go to Washington, to see if we could secure the removal of the quarantine on our stock. A few weeks after we were able to declare to the people of this country that there would no longer be a 90 day quarantine on Canadian cattle going into the United States. This took place on 1st of February last. You understand what this means to the people of Canada and to the people of the Province of Ontario especially. In the years during which that quarantine existed, we exported in 1894, 256 animals ; in 1895, 862 animals ; in 1896 we sent 16,046 animals ; but in the nine months of 1897, from the first of January to 1st of October (and one month of that was not open because the new arrangement did not come into force till 1st of Feb.) we sent 78,857. (Applause). In other words we sent in nine months animals to the value of $777,000. This was the result simply of removing that quarantine.

You can understand what an effect this has had upon the value of the stock of this country. It has had the effect of removing a large number of animals from this country and from the markets of this country which at this time last year were glutted with animals, numbers of which were not fit for the market—we only had the English market—but the removal of which has not only brought us the money they were worth, but has improved the value of all our stock remaining on hand.

I have a statement here from one of the largest exporters of live stock during this year. He says : "During the year there was an enormous number of cattle raised in the North-west, and there would have been a serious glut if many had not been taken across the line for feeding purposes. In fact if this outlet had been closed, I believe cattle in Montreal would have sold at a cent a pound, for which we are now getting 2½ and 3 cents." I have no hesitation in saying that I believe this is the case, and that our stock industry has been very much benefited by that action.

There is another point I wish to touch upon ; I, am glad to notice that at this Fat Stock Show, we also have a dairy class. After all, the stock raisers and stock keepers are all tied together and work in harmony one with another, and by benefiting one class of these stock-raisers we benefit another class. This year we have had an enormous exportation of dairy products to Europe. For a number of years we have been particularly increasing our butter export. Our cheese export has been enormous for many years. You have here Mr. Ballantyne, the father of cheese making in this part of Ontario, and the father of the great reputation our cheese holds in the markets of the world. This has been an enormous advantage not only to the farmers but to the whole people; and I cannot help once again drawing attention to this fact that there is one industry in the world at the head of which Canada stands, and that is not the manufacturing industry, it is not any of the professions or businesses, but the cheese industry. It is the premier country in cheese making of the world. We can congratulate the farmers, the stock-breeders, and the cheese-makers for the reputation we to-day hold.

I want to draw attention to the fact that our butter export has been increasing very largely. During the season of navigation in 1894 we exported 32,000 packages of butter from the port of Montreal. In 1895 we exported a little more than double that, namely 69,000. In 1896 we, doubled it again exporting 157,000. In 1897, up to the present time, we have not quite doubled it, but have increased it by over sixty percent, exporting 216,000 packages. This means a immense stimulus to the stock interests of this country. It means that stock good for the dairy is going to be in demand: that the breeders of this class of stock—the men who have created these animals—are going to have a better demand for them, because it is only through the machines they are producing (for a dairy cow is like a machine) that these dairy products can be supplied to the markets. It is only by reason of the beef production of this country that we are going to be able (and I believe within the next year or two we shall be able) to export still larger quantities of meat to Britain. We have at the present time a large export trade in beef cattle. We are just beginning to make experiments in the export trade in dead meat. You know that our swine industry is largely dependent on the export of a fine quality of bacon to the British market, and there are firms in Ontario that have obtained a first position because of the excellence of this product. Such animals as we see here to day are but the beginning of an enormous industry which is to be brought about soon for the export of large quantities of dead meat in cold storage. This is a thing that requires more development, because a market has not yet been made, but I think there is here a good opening. In this same connection we have to develop certain lines of transportation that are required for these dairy, meat and other products. I was very much struck the other day when I found that of the bacon products of the province a very much larger proportion go to England by United States ports than from our own. Why? Not because it is shorter; not I believe because it is cheaper, but because the vessels going from the great ports of Boston and New York are quicker and surer and arrive to a day to the market there. Till we can have such steamers running from our own ports we are going to lose a portion of this traffic. We want improved transportation possibilities; we want improved transportation connections, and faster and larger vessels so that our Canadian products may go straight to the old land without going to any foreign country.

We have in our North-west an almost unlimited field for expansion. It is probable that within the next year or so there will be a tremendous influx of people interested in mining. These will not produce their own food. Along with that mining population we must have a large increase in our agricultural population in the Northwest. That means that these people must come here and buy pure-bred stock and take them there to produce the things that the mining population which is sure to come to us will demand. During the summer which has closed we have had a successful season of dairy production in the North West Territory. You may remember that there were a large number of creameries established there this season under the Dairy Commissioner of my Department. There were sixteen creameries and sixteen skimming stations, and the result was 473,000 pounds of butter. Of this 188,000 pounds were exported to Europe, and the whole of the remainder consumed by the British Columbia people and the territories. This winter the people of the Northwest and British Columbia are not going to be able to produce anywhere near the butter alone, to say nothing of the cheese, beef and other things which the mining population of British Columbia is demanding. The deduction to be drawn from this is that in the near future there is going to be an immense demand for our pure bred stock, and you who have made such a reputation for yourselves are going to reap advantage and profit. I congratulate you the farmers and stock-keepers of this province on the bright prospects that are before you. (Applause.)

ADDRESS BY MR. MORTIMER LEVERING.

Mr. Mortimer Levering, Secretary of the American Shropshire Registry Association being called upon by the Chairman, spoke as follows :—

Mr. Chairman Ladies and Gentlemen :—I have been reminded in listening to the songs I have heard and by the presence of the ladies here this evening, that we farmers cannot get along without the women, and we are very glad to see them here. One of the speakers preceding me spoke of the lack of rich men taking an interest in farming in the United States. Well, I think we may say we are divided into two classes, first the farmers who having acquired a competency go into the towns and speculate and lose it, and second, the men who having made their money in business, etc. go into farming as a pastime and soon spend it. But it is astonishing how many rich men are represented in farming in our country. Hood, the manufacturer of Hood's Sarsaparilla, has perhaps the greatest Berkshire and Jersey farm in the world, although George Vanderbilt ranks along with him. It is not speaking slightingly of Guelph to say that this is the best Live Stock Show you have ever had in Canada. You are to be congratulated on the management of it, and the liberal patronage it has received. The class of stock is so much in advance of what former shows have had, that it may be classed as the maximum of perfection.

RECEPTION AND ADDRESS BY THE BOARD OF TRADE.

The meeting then adjourned to the Kerby House where a reception was tendered the visitors by the members of the Brantford Board of Trade and their wives, at which Mr. Goold read the following address:

Mr President Ladies and Gentlemen :—On behalf of the Board of Trade, and the Ladies of the Southern Fair Board, it affords me much pleasure to extend to you a most cordial welcome to our city. I feel you are thoroughly deserving of this welcome, because I recognize in your Association an educator that is certainly to have a most powerful influence upon the future welfare of this most bountifully blessed Dominion of ours. As a patriotic Canadian, with unbounded faith in my native country's future, I may be excused if I say to-night there is no other country in the world, that is so rich in its many and varied natural resources, as this Dominion of which we are all so proud. We have our fish, our seal, our mineral wealth, but most important of all we have our millions of acres of wonderfully rich farm lands, so essential to the welfare of the cattle, sheep and hogs, that are destined to bring to Canada a never failing stream of golden dollars. As long as I can remember, the farmer the tiller of the soil, has been accused of being the back bone of this country. Year by year he has proceeded in making such a steady progress, that every year he finds it more difficult to plead not guilty to this charge.

We have much for which to thank associations such as The Ontario Provincial Fat Stock and Dairy Association. It is on occasions like this, that the best farmers and stock raisers of our country have an opportunity to meet and compare notes. It is from this trading of experiences that the intelligent breeder learns which breed of cattle is best for the Dairy, and which gives him the best returns when converted into beef. It is here, in short, that he learns the hundred and one little things that are absolutely essential to successful farming. The farmer who becomes interested in your Association cannot very well fail to be benefited, as it is here that he will acquire much of the knowledge that in years to come will make Canada famous throughout the universe as an agricultural country. In my opinion there is no class of Canadians who have progressed so rapidly in recent years as our sturdy farmers We do not have to look very far back to the time when Canadian farmers were content to go on in the old way, with inferior buildings, inferior stock, and inferior methods of doing business—the farmer content to allow his cattle to run at the stock. his farm implements to stand in the fence corners, the barns and out buildings to run along without repairs, his hens to freeze on the tops of his buggies in some open shed, and his wife to take full charge of the dairy end of the business.

There has been a radical change however in recent years. Now there is a place for everything and everything in its place. New buildings have been erected, stumps and stones have disappeared, modern fences have been put up, farm stock is comfortably housed, the hens no longer freeze their toes on the new top buggies, as the top is covered with cotton in the carriage house, while the hens are busy producing eggs in a fine warm house that has plenty of sunshine beaming in through the big windows at the south. The old cows that were neither good for the dairy or beef purposes, have given place to the Shorthorn, Devon, Hereford, Jersey, Holstein, Aryshire, and Guernsey, and although the good wife admires them very much, and offers no end of valuable advice, the farmer himself gives his personal attention to see that they are clean and comfortable and abundantly supplied with the food that will give the best results for the purposes he has in view. He is ambitious to excel and increase his constantly gaining bank account, and the result is he systematizes every detail of his work

Canada is making rapid progress as a mercantile and manufacturing country, her goods going to every country in the world, but she must be regarded as being first and foremost an agricultural country. When we consider the very important influence your Association has upon the most important industry that is ultimately destined to create new markets for our farm products, and eventually bring us dollars and population, I feel that Brantford and Brant County has been honored by being able to entertain you. Aside from this, there is probably no city in the Dominiion to-day whose interests are more closely allied with the success of the farmers than those of Brantford. As a manufacturer I can tell you to-night that we feel that our welfare depends upon your welfare, for it is you who buy the bulk of our agricultural implements, our stoves, our binders and binder twine, our cottons, our woolens, bicycles and so forth, In this connection I might state that the various manufacturers of the city so fully realize the importance of your visit to Brantford that they extend to you an invitation to visit their various factories.

With regard to the export trade for our foreign products I can see in the rapid growth of exports of Canadian cheese a bright outlook for our other products. To be the success it deserves to be, it will be necessary for every exporter to be thoroughly conscientious and honest in the matter of never sending anything out of the country that will bring discredit to the Dominion. By adopting a high clase ability as our watchword and living strictly up to it we will enrich ourselves, give our county a good name, and produce a population that will build up our Western prairie country. I do not think the time is far distant when we will see an influential agency that will do much toward forming trade relations, that will bind us more firmly to the mother land, and impart valuable information concerning our agricultural and mineral wealth, that will attract our kinsmen across the sea, and substantiate Canadian homes here to assist us in upbuilding of Britain's leading colony. Your splendid Association has my best wishes for success throughout this and ensuing years, and if we may not be deemed too avaricious, I hope we may have the pleasure of entertaining you here next year, when I think I may safely pledge the citizens of Brantford and the sturdy yeomen of Brant County to use their honest endeavors to assist you in perfecting and explaining the great educational work you are doing.

Mr. Hobson made a fitting reply to the address; and after listening to a varied programme of vocal and instrumental music, the company adjourned to the supper room, where an inviting repast was spread, and thus concluded a most enjoyable evening.

APPENDIX II.

OFFICERS AND COMMITTEES OF THE PROVINCIAL FAT STOCK AND DAIRY SHOW FOR 1898.

President, John I. Hobson, Guelph ; Vice-President, J. C. Snell, London ; Secretary-Treasurer, F. W. Hodson, Toronto.

Executive and Programme Committee.

President, Vice-President, Secretary, and Messrs. J. E. Brethour, Burford ; Jas. Tolton, Walkerton ; H. Wade, Toronto ; G. W. Clemons, St. George ; C. W. Yapp, Brantford ; H. A. Foulds, Brantford, and David B. Wood, Brantford.

Committee on Cattle.

John I. Hobson, J. C Snell, G. W. Clemons, C. W. Yapp and S. Suddaby, Brantford.

Committee on Sheep.

Jas. Tolton, John Jackson, Abingdon ; D. G. Hanmer, Burford ; E. B. Eddy, Brantford, and H. A. Foulds.

Committee on Swine.

G. B. Hood, Guelph ; S. Suddaby, J. E. Brethour, Geo. Green, Fairview, and Thos. Teasdale, Concord.

Dairy Committee.

G. E. Day, Guelph ; H. Wade, G. W. Clemons, R. G. Murphy, Elgin ; J. M. Shuttleworth, Brantford.

Poultry Committee.

E. B. Eddy, Geo. Wright, Brantford, and J. O. Montgomery, Brantford.

Reception Committee.

John I. Hobson, Mayor Raymond, Harry Cockshutt, Brantford ; Douglas Reville, Brantford ; T. H. Preston, Brantford ; Arthur Johnston, Greenwood ; Frank Cockshutt, Brantford ; Jos. Stratford, Brantford ; H. Wade and F. W. Hodson.

SUPERINTENDENT OF BUILDING.

D. G. Hanmer, Burford.

OFFICIAL REPORTER.

R. Gibson, Delaware.

REPRESENTATIVES FROM VARIOUS SOCIETIES FOR 1898.

Dominion Cattle Breeders' Association. G. W. Clemons, St. George ; John I. Hobson, Guelph.

Dominion Sheep Breeders' Association. Jas. Tolton, Walkerton ; A. W. Smith, Maple Lodge ; F. W. Hodson, Toronto.

Dominion Swine Breeders' Association. Major G. B. Hood, Guelph ; J. E. Brethour, Burford ; Geo. Green, Fairview.

Butter and Cheese Association of Eastern Ontario. Henry Wade, Toronto ; R. G. Murphy, Elgin.

Brantford City Council. Ald. David B. Wood, Brantford.

Township Council. C. W. Yapp, Brantford.

REPORT OF THE FOURTEENTH PROVINCIAL FAT STOCK AND DAIRY SHOW, 1897.

By Richard Gibson, Delaware, Ont.

> " Little drops of water
> Little grains of sand,
> Makes the mighty ocean
> And the pleasant land."

The little contributions from this hamlet, and the larger ones from that, combined to make a show at Brantford that could well be designated "mighty," and the enthusiasm of the citizens thereof at having the Provincial Winter Show in their midst and the hospitality extended to the exhibitors by them, made it indeed a very "pleasant land." The building was capitally adapted to the purpose, and with the help of banners, bunting, etc., and in the evening the bright electric lights, it was made quite attractive, and instead of the cold, damp places occasionally provided, this was always warm enough to make it comfortable for ladies and visitors. The management was also good; the alleys being unobstructed by feed, bags, etc., and being kept scrupulously clean, was quite an innovation, and this fact no doubt added to the attendance, which daily increased, showing there was nothing in connection with the show that could offend the most fastidious. The attendance during the week was greater than the most sanguine could have anticipated.

A word as to the difficulties encountered by the Show Committee and to place on record the generosity of the Grand Trunk Railway Company. After an arrangement had been consummated, as was understood by the Committee, the Armoury, one of the buildings promised, was refloored and the walls painted and decorated; the commandant under the circumstances did not feel justified in having it used for a stock show. However, the Grand Trunk railway shops were generously offered by the company, they (the shops) then lying idle through the removal of the plant to London. This offer was thankfully accepted, and what at one time looked like a most calamitous blow to the success of the show was, in fact, a most propitious event, as it was the cause of there being placed at the disposal of the Committee a building that, for the purpose, could not be surpassed in the Province, if we perhaps except the Armoury at Toronto.

The success of this meeting must be a matter of congratulation, not only to the officers who have been instrumental in carrying out the programme assigned, but also to all well wishers of what has become the most looked forward to, and the most important of the many agricultural gatherings held in the Province. This yearly increasing success could not have reached the magnitude it has done, "the little drops of water become the mighty ocean," without the untiring efforts and unselfish motives of all the officers of the combined associations. Each and all have had the success of the show at heart, petty jealousies have never been allowed to creep in, and with a single purpose each has worked for the good of the whole. It would be invidious to mention names when all have striven so heartily, but that of the Secretary must not be passed by without mention. He is not only skipper, but pilot also, the safety of the ship for a time being in his keeping. To him we are apt to assign the blame when things go wrong, hiding ourselves behind his back; at the same time we are quite willing to assume the credit when success is assured. So to him an acknowledgement is due, now when the ship has been brought to a safe anchorage after a somewhat anxious passage, and chartered to a strange port.

It must also be a matter of congratulation, and something to be proud of, that the farmers of Ontario can conceive and carry out to such a success a show of the magnitude and importance of the late one, without the help of outside so-called attractions. It is a show unique on this continent, inasmuch as it is under the entire control of the stock breeders themselves. No expensive managers are employed to give éclat because they are in with "the boys"; neither has a circus to be run in connection therewith to draw the crowd. It is a show purely agricultural, conducted on principles to please the public, without offering inducements or attractions to draw their attention to the often frivolous and sometimes indecent addenda, from the more important ones of our flocks and herds, the backbone, the mainstay of our Province. When such has been accomplished it is a fact of which every man ought to be proud, whether Premier or peasant, Minister of Agriculture or minister of the Gospel. In the gathering at Brantford was got together a collection of fat stock such as has never before been under one roof on this continent. We are aware that it is usual to make some such statement, but without fear of contradiction we unhesitatingly pronounce it to be the case, having in mind all our best shows as well as those held in the old Exposition building on the lake front, Chicago. Undoubtedly at the latter place there have been better exhibits of Angus, Herefords and Galloways, but never such a show of sheep, swine and cattle combined.

It might be as well to chronicle the advent of a noted winner of two grand sweepstakes at the national shows in the United States for 1896 and 1897, with the Chicago honors fresh upon his brow. Though unsuccessful on this occasion, let us hope that this may not be the last of such contests. Our breeders do not hesitate to throw down the guantlet in the show rings of the United States, and many a hard fought victory has been gained by them on foreign soil, and we are sure that we are only echoing the sentiments of all when we extend to the American breeders an invitation to our show yards, and assure them that none will be more glad to congratulate them when successful than their Canadian friends. Such visits do good all around. We know each other better therefor, and knowledge leads to respect. They also tend to enlarge men's minds and broaden their views as regards their neighbors on either side of the line.

Another fact must be chronicled, and that is the great interest taken in the show by the ladies. Never has a fat stock show been so honored before, and next year we hope to see them take the same interest, because where they are, surely the men will be found also.

The only drawback was the absence of buyers and the low prices offered by those who were in attendance. We went to Guelph specially to ascertain whether Brantford was boycotted by the buyers, as intimated. We do not believe it was, as prices ruled there no higher; but the situation may be described better by an extract from Clay, Robinson & Co's trade circular, titled "Live Stock Report," puplished at Chicago stock yards for the week of our show: "Grey-headed cattle salesmen who began as boys, say they have sold cattle at lower prices, but they never saw all kinds of cattle so hard to sell at any price as to day. The market last week closed 25 to 40 cents lower than the opening of the week as was stated in these columns, and to-day it is 25 cents lower, making a fall of 50 to 65 cents lower than at the opening of last week." Comment is unnecessary.

The judges on cattle were Messrs. R. Miller and Jas. Smith. They did their work well; probably never has there been less grumbling by exhibitors; and the critics around the ring, who so freely express their opinions, but who recognize no responsibility, were apparently satisfied. Another item of interest and importance in these days when the most pretentious shows sometimes fail to pay the prize money until months after due, was that every prize winner got his cheque the afternoon of the last day of the show, and the obliging manager of the Bank of Commerce was on hand in the building with funds to cash each cheque. It is the carrying out of such little details that makes the perfect management.

CATTLE.

The quality throughout was quite in advance of any previous year. The Shorthorn grades were so remarkably good, particularly in the female classes, that one might fancy their more aristocratic pedigreed sisters jealous even unto envy. In reviewing the cattle classes the limits of this report will not allow mentioning all that deserve notice, but only a running comment can be attempted. We may, without intention, miss several that ought to have more than prize list honors; to such we would say, pardon any oversight; attempting to watch three rings all being judged at the same time, and not any intentional slight, must be our excuse.

Shorthorns. As usual, at an Ontario show, Shorthorns far outnumbered the other breeds, though in the opening class but two put in an appearance. H. & W. Smith's Bruce, and Jas. Leask's Indian Chieftain, a son of imported Indian Chief and Crimson Ray. The former had an easy win; he is a big smooth steer showing quality with substance, plenty of length, and with a finish seldom seen. He was got by Abbottsford (by Blake ex Village Blossom, the dam of the sensational Columbian winner, Young Abbottsturn) and his dam, Bonnie Brae, was by Prince Albert, by Watt's old Barmpton Hero,—good enough breeding to satisfy Amos himself. Bruce won as a yearling, second at Toronto, second at London, and first and sweepstake Shorthorn steer at Guelph; as a two-year old, first at Toronto, second at London, and first and sweepstakes at Brantford. Bannockburn (white), the first prize yearling Shorthorn, is full brother to Bruce, while the second prize calf, also white, was by the same sire, Abbottsford. This string of whites shown by Messrs. Smith, made such a unique exhibit that it would be sufficient to almost convert a fanatic of the red color craze who in season and out of season is continually chanting this dirge, "There is no Shorthorn but the red Shorthorn, and I am his Prophet." While on this subject we would observe for the benefit of any in Ontario who may still be tinctured with this insane delusion, that the Grand Sweepstakes at the Provincial Fat Stock shows have been won by whites three times during the past four years. The *yearling* class was not so good, though there were five competitors. H. & W. Smith were first with Bannockburn, not so forward as his brother last year, but just right for going on with, and he is built on such lines that he is bound to be heard of later. Mr. Bolton won second with a fatter, and on the day of the show, a better butcher's beast, but he was not grown on such symmetrical lines, neither was his flesh evenly distributed. Mr. Rennie won third with a son of the White Valasco 22nd. *Calves* were a better class. J. Fried & Son showed a thick, well grown youngster that will probably be at his best next year, seeing that he was so forward this. H. & W. Smith had a good framed thick white; he might have more length but he is built on the lines that induce improvement and never get out of shape. Jas. Oke had a very useful calf in this class. *Cows*—J. Fried & Son were first with Blenheim Cherry, nicely proportioned and carrying plenty of flesh; second went to Capt. Milloy. *Heifers, two and under three* only furnished three entries; James Rennie was an easy winner with his White Lily of Layton, a daugher of Valasco 22nd; while second and third were placed on Capt. Milloy's entries. There were only two entries for *heifers, under two years*; J. Fried & Sons were assigned first, and J. Oke second.

Herefords and Angus were scheduled together, and the first class called, that of *Steers or heifers, under three years*, brought out strong competition; there were three Herefords and two Angus forward, and, eventually, the former were assigned the three money prizes, while the Angus had to be contented with the empty honors of highly commended and commended. The first was awarded to W. A. Rinehart, second F. W. Stone Estate, third to H. D. Smith. This contest was closely watched, as it was the first appearance of the United States champion for 1896 and 1897 in a Canadian show-yard. Though he easily won, it was evident that his journey from Chicago and the change since had not agreed with him. He was calved February 2nd, 1895. bred by W. S. Van Natta & Son, Fowler, Ind., sired by Eureka, 58,549, dam by Jennie Fowler, 49,207, now owned by W. J. Rinehart, Buffalo, N.Y. In 1896, at the show of the National Live Stock Association of America, held at Madison Square Gardens, New York, he was awarded first in his class, Sweepstakes for best Hereford, Sweepstakes for best yearling, any breed, and Grand Sweepstakes, any age or breed; in 1897, at Chicago, first for best Hereford, two and under three years, Sweepstakes for best Hereford, any age, Sweepstakes for best two year old, any breed, and Grand Sweepstakes for best steer in the show, any age or breed. To this we would add that as a yearling at New York last year, when we had the honor of awarding him the Grand Sweepstakes, we thought then that he was the ripest and best yearling we had ever seen, but also thought that he had arrived at his best and could not successfully be carried along for another year; that he was again brought out as a winner must be regarded as a triumph for his feeder. The Stone Estate was second with a big one, not the type usually found amongst Hereford breeders of the present day. He was a capital butcher's steer, barring his heavy front, being especially good where the high cuts are found. Mr. Smith, Compton, Que., was third, thus making a triangular duel, the United States, Ontario and Quebec being the contestants. For *yearlings* Mr. Smith had an easy win with Fairy of Ingleside, a good thick-fleshed sort of capital quality ; J. Bowman second, with the good Ian of Tweedhill ; third went to the F. W. Stone Estate. The next class, *under one year*, introduced one of the plums of the show. We refer to Walter Hall's Angus, Robin. by Lucretius. This is one of the best calves that has been shown for years, and with judicious feeding will, with age, make a strong bid for championship honors. J. Bowman won second and third with a pair of good heifers. In *cows* Mr. Bowman carried off all the honors. One of this lot was Mysie 2nd of Verulam, 5 354, by Ermine Bearer (Imp) ; dam, Mysie of Verulam, 2,757, whose sire is the noted Erica bull that Mossom Boyd imported, and so well known in the United States as an excellent sire. In 1895 she won first and diploma for female, any age, at Central Exhibition, also first at the Provincial Fat Stock Show. In 1896 first at the Industrial Exhibition for fat cow, any breed ; she was also one of the five that won the gold medal at Montreal for five export beef animals, and was first at the Provincial Fat Stock Show. In 1897, first at the Provincial Fat Stock Show, Brantford.

Galloways and Devons. These classes were not very strong, either in numbers or in producing a plum equal to what the previous breed classes had done. In Galloways Mr. McCrae won first in *two year old* class and first and second amongst *calves.* His stock were all young and had not been fitted for strong competition at a fat stock show. Mr. Rudd's Devons were in decidedly better flesh than they sometimes carry, and he was successful in winning two firsts, three seconds and one third.

Grades and Crosses. At our Fat Stock Show the Grades and Crosses are usually the most interesting of all the classes to the breeder who has bulls to sell ; to the feeder who wishes to convert his coarse grains into beef ; to the student, and most of all to the everyday farmer who has been led to look upon thoroughbred stock as gambling tools in the hands of men who keep them simply to catch suckers or to play a game in which they stand to win and can't lose. He looks upon these grade breeders, however, as of the same class as himself. There are no herd books or pedigrees with which to mystify him, consequently he is willing to admit that there is nothing supernatural in these grade cattle. They are not hot-house plants, and have not to be fed on carbonaceous and nitrogenous foods ; corn and oats, turnips and hay being good enough for them Long may we have such men as Leask and Oke, Rennie and Fried, *et al*, to show the perfection to which breeding and feeding have attained, and what can be accomplished by the use of thoroughbred bulls, if the progeny is taken care of. The names of the above exhibitors are as deserving of a niche in the temple of fame as are those of their more noted associates who only compete in the thoroughbred classes. The secret of the success of these men is their love for their calling and for their stock, their intuitive skill in selecting bulls adapted to their purpose, and then the care and assiduity with which they attend to and look after the produce of their herds. The *two year old* class produced an entry of ten, perhaps the strongest in the show, and it certainly contained in the winner one of the gems of the cattle classes—we refer to J. Fried & Son's red "Look-me over" (by the white son of Indian Chief, as were all Fried's winners). He is a thick fleshed good butcher's steer, flesh firm and very evenly distributed, the nearest approach to being both a good butcher's and a good feeder's steer on exhibition. The second went to one shown by James Rennie. His flesh was not as evenly put on, but he would also kill out a thick good carcase. A useful Hereford grade with plenty of roasting meat was third, shown by Peter Marshall. Class for *one and under two*, J. Campbell showed two handsome ones. The first, justly placed, being at that time the forwarder and riper, though the second had more outcome and will probably forge to the front next year. They were an excellent pair, and by a white son of Indian Chief, as were Fried's, while Mr. Rennie is using a white, bred by Messrs. Nicholson. "These whites won't down." Leask third with another white, and Rennie with a neat one was a good fourth. *Under one year* was a good class, and H. D. Smith's Hereford grade made a strong bid for first place ; a little more flesh would have landed him there, as his conformation and character were in evidence. As it was he had to be satisfied with the blue, the red going to James Leask's white. J. Campbell was third with Fried fourth. *Cows, three years or over.* Nine were marshalled before the judges, and a good lot they were, James Oke winning with Red Rose, a thick fleshed cow; J. Bowman second, with a grade Angus, smoother and the favorite with many around the ring; James Rennie third. *Under three years* produced a good lot. James Oke again captured the red with a capital heifer, thick and evenly fleshed; J. Leask winning second and third with the first of Moneyfuffle Lad's produce. He ran James Oke a hard race for first place, and if she is a sample of what the "Lad" can produce, he will prove a most valuable sire. *Under two years* introduced some plums. James Oke, however, was again ordered to the front to receive the red ribbon. (Three in succession ought to satisfy the greatest glutton.) She was, howeder worthy of the distinction, but what a sacrilege it seemed to consign such a heifer to the block. J. Fried was awarded the blue and then the Herefords had a look in with Mr. Smith's Lady Dunham 22nd. The special offered by the Dominion Shorthorn Breeders' Association for *Best grade steer, sired by a pure bred bull* was won by J. Fried & Son's "Look-me-over," and Arthur Johnston was happy.

GRAND SWEEPSTAKES FOR BEST ANIMAL SHOWN IN CATTLE DEPARTMENT.

This year the competition was more than usually interesting inasmuch, as this is the first time our fat stock show has been honored by the presence of a foreign contestant, and if we did receive him with hospitable hands we were not allowed to welcome him to a gory grave, as he, after giving bonds, peaceably returned whence he came. Another reason why it was more than usually interesting is that a Hereford aspired to championship honors after years of subdued indifference or confirmed acknowledgement that the Shorthorn was king. Not so this year, and when the various contestants appeared in the ring the excitement around the ropes was intense. Of course as nearly all Ontario breeders are Shorthorn enthusiasts, the majority of the spectators were of that particular faith, and the suspense more nearly approached that as witnessed at the New York Mills sale than any we have seen since. Could the foreigner win? If so, what would be second, the white or the red? The judges, without much hesitation, gave the ribbon to the white, Harry Smith's Bruce. He was a better pure-bred than has been shown for some years. It might be urged against him without injustice that he was further from the ground than is usually found amongst Aberdeen Shorthorns, and with the result so often observed, he was also longer. It might also be recorded that he had a slight droop in the back that detracted somewhat from an otherwise symmetrical contour. J. Fried's was, perhaps, the best butcher's animal, not that he would dress a higher percentage than the Hereford, but that he would be a more profitable killer. The Hereford was decidedly the thicker fleshed, on the shortest legs, and "contained the greatest weight in the smallest superficies," but he was overdone, too fat in fact. After the award was made there went up a cheer, not one as gloating over a fallen foe, but as a sigh of relief giving vent to pent up feelings. And after all, though it was a great and deserved victory, we must remember that a set of Hereford judges would have reversed the award. He was built on Hereford lines, thick through, close to the ground, with a better hind quarter than usually falls to the lot of a Hereford. "Different people have different tastes, some prefer a 'hinyun' others a 'happle.'"

SHEEP.

The quality of this department was far superior to that of any fat stock show we have had the pleasure of attending outside the large English shows at Birmingham and Smithfield, and it yearly becomes more difficult to win; not only are there more contestants, but the breeds are more clearly defined, though occasionally one of the old-fashioned, up standing, big-eared Shropshires puts in an appearance. The judging on the whole was well and conscientiously done, but some of the classes were so large that it was not until the evening of the second day that it was completed. It is not a wise thing to overwork judges, and it may be found necessary to enlarge the list.

Cotswolds, as per catalogue, were first on the list and they made a good showing. In *shearling ewe* class but four faced the judges; J. Park & Son were first and second, with Geo. Allan, Oriel, third. In class for *ewe lambs* seven appeared, and they were a capital lot, showing breed characteristics as well as good fleshy carcases. After the round up, J. Park & Sons had first and third prizes, J. Snell second, and Geo. Allen fourth. The next class, for *shearling wethers*, let in some of the feeders, J. Rutherford capturing first and third, the latter being the Chicago winner; they were well fed to a finish J. Park & Sons divided them for second place with a more typical Cotswold. Wm. E. Wright was fourth. In *wether lambs* W. E. Wright had an easy winner with a grand one, so truly made and full of character that it seems as though he missed his vocation and was a wether by mistake; he was bred we believe by W. Laidlaw. Park & Sons were second and third. In *pens of three wether lambs* Park & Sons won first and third, W. E. Wright being the sandwich. *Pens of three ewe lambs*, Park & Sons first and third, and J. Snell second. This was a proud day for the Park dynasty.

Lincolns. There is always strong feeling as well as strong showing between the rivals competing for the Lincoln premiums, the two competitors being kept up to high water mark for fear the other should get the start. The tale of the judging is easily told, as Gibson & Walker captured everything except second in shearling ewes and second in pen of ewe lambs, which went to Wm. Oliver, while J. Rutherford & Son won third on shearling wethers.

Leicesters. These old time favorites made the best attempt for championship honors this year that they have ever done; at last they were within one of winning. In *yearling ewe* class W. A. Rennie (a son-in law of the veteran J. Kelly) was first and third, with Whitelaw Bros. second and Orr & Lillico fourth. The first prize ewe was a remarkable specimen. one of the best fleshed sheep in the show and in the pink of condition. In *ewe lambs* W. A. Rennie was first and fifth; Orr & Lillico second and third, and Whitelaw Bros. fourth. This was a good class of seven competitors. *Shearling wethers* introduced but four contestants. While the number was small the quality was something remarkable; the winner, owned by J. Kelly, weighed something near 400 lbs, and was a mountain of mutton, and notwithstanding his size had a firm back. Orr & Lillico were second and third with a capital pair, and J. Kelly fourth. *Wether lambs.*—Orr & Lillico won first, second and third, and first for *pen of three*, while in *pens of three ewe lambs* they also scored first, with W. A. Rennie second and Whitelaw Bros. third.

Oxfords made the best show they have ever done, both as to numbers and quality. *Shearling ewes.* Smith Evans won first on a capital specimen, while E. Turner was second and fourth, with J. H. Jull third. This class was a good one and gave the judges quite a task to place them. In *ewe lambs* they had an easy question as Smith Evans won first, second and third, also first and third for *pens of three ewe lambs.* In *shearling wether* class but four appeared to represent the honor of the breed and but one recognized breeder was to be found in the lists, viz., Mr. Jull, though the two Shropshire breeders, Messrs Beattie and Wright, made a most interesting exhibit, the former capturing first, with J. H. Jull second and third. In *wether lambs* W. E. Wright won first, second and third, and naturally the pen prize followed class awards.

Shropshires were very strong in most classes, the weakest was that for *shearling ewes*, being represented by only four. J. Campbell was fortunate in being placed first, while D. G. Hanmer & Sons, his only competitor, were awarded the other ribbons. *Ewe lambs* quite made up for the slackness of the previous class, twelve facing the awarding tribunal, of which number J. Campbell supplied three, Hanmer seven, Beattie one, and Wright one J. Campbell secured second place, and Hanmer & Sons all the other ribbons; probably never has one firm showed such a grand lot of lambs in one ring as the Messrs. Hanmer did on this occasion, very uniform, well grown and well fitted, they were quite one of the interesting features of the show. The class for *shearling wethers* was comprised of ten entries. This class was far from uniform, containing specimens ranging between the "wee" Southdown and the "muckle" Oxford, and the big ones were in favor. Hamner led with a good backed sheep low on shoulder and bad behind; Beattie second with a capital sort, firm fleshed and of good quality; Campbell third, and Gibson fourth. *Wether lambs* introduced an extra strong list of entries, and when thirteen filed into line it was a sight worth going many miles to see. They were much more uniform in appearance than their elder brethren, consequently there devolved upon the judges a harder task; eventually Gibson's Chicago first prizeman was selected for premier honors, closely followed by Beattie, Campbell, Wright and Gibson in order named. In *pens of three wether lambs* Gibson again scored first, Beattie second, and Wright third. In *pens of three ewe lambs* Hanmer won first and second, with Campbell third. The Shropshire specials followed class awards.

Southdowns put up their usual creditable show, and when we name Jackson, Douglass, Simenton, Baker, Telfer as amongst the exhibitors it is a sufficient guarantee to frequenters of the show yards of late years to know that the breed was well represented and the exhibits well handled; none bring them out better or make them more attractive to the sightseer. Five *shearling ewes* were the first to put in an appearance. Jackson won first and third, Telfer second, Douglass fourth and Simenton fifth. Ten *ewe lambs* faced the court, and the court had no easy task to place them. Simenton was eventually pulled into first place with a capital specimen, well grown, and carrying lots of firm flesh; Jackson second with one that induced a lot of consideration before she was set back; Douglass third, Baker fourth, Telfer fifth. Eight *shearling wethers* answered the call, and as the champion of the show was found here it deserves more than a passing mention. W. H. Beattie with a "Dale" wether and R. Gibson with a "Douglass" put up a strong fight for premium honors; the former was perhaps a trifle better below, but the latter had the firmer back. They were both model butcher's sorts and would dress a better percentage with less waste than any other shearlings in the show. Douglass captured third and Baker fourth. Thirteen *wether lambs* made a great show. A. Simenton & Sons were more fortunate here, winning first, fourth and fifth, with Baker second and Telfer third. *Pens of three wether lambs.* Simenton, Telfer, Douglass, and Baker stood as in order named, while in *ewe lambs* it read Simenton, Jackson, Douglass, and Baker. The Southdown special was won by J. Jackson & Son.

Dorsets and Merinos. As usual R. H. Harding had pretty near a walk over, as he won all the prizes for *shearling ewes* and *wethers*, also first for *ewe lambs*, with W. E. Wright second, and all prizes for *wether lambs.* Mr. Harding had his entries in nice show condition and was ready for stronger competition.

Hampshires and Suffolks require but little comment. The principal winners were J. Kelly and W. J. Rudd in ewes and lambs, with Rutherford, W. H. Beattie and R. Gibson in shearling wethers.

Grades and Crosses formed an interesting collection to outsiders, but must have been a veritable Chinese puzzle to the judges, as each class could not but help to appeal to their instinctive preferences for the long or the medium wool breeds. Nevertheless they handled their classes well and were governed in a great measure by wealth and depth of flesh evenly distributed along the back and ribs. Of the six *shearling ewes* J. Campbell secured first and second with grade Shropshires, well fitted and in blooming condition, followed by E. & N. Parks' Cotswold cross. *Shearling wethers* were also a great class, and again the Shropshires, carried their banner to victory, the fortunate prize winners being Messrs. Hanmer, Rutherford, and Beattie. When the lambs answered the call the long wools had an innings. *In pens of* three *wethers* Orr & Lillico were first with an extra good pen of Leicesters; Oliver second, Lincolns; Kelly third, Leicesters; Campbell fourth, Shropshires; Gibson fifth, Shropshires. In *single wether lambs* Oliver captured first and third, with Orr & Lillico second and fourth, all long wools. In *ewe lambs* there were eighteen entries but only twelve faced the ordeal; they were scarcely as good on the whole as the previous class. J. Rutherford captured first with a Shropshire derivative; Gibson & Walker second with a Lincoln; Orr & Lillico third with a Leicester; Campbell and Beattie fourth and fifth with representatives of the Shropshires. In sweepstakes *best grade under* two *years*, J. Campbell had an outstanding winner, Hanmer running up. *Sweepstakes for best sheep in the show* brought out all prize winners, the following being represented, Lincoln, Leicester, Shropshire, Grade, Cotswold and Southdown. The judges were the six who had been working on the classes. They began by balloting for the worst, and they were ordered to their pens as soon as their fate was announced. This left but five, consisting of Jackson's Southdown shearling ewe, W. H. Beattie's Southdown Shearling wether, J. Kelly's Leicester wether, J. Campbell's Grade Shropshire, and R. Gibson's Shropshire lamb. The next ballot disposed of the chances of all but the Southdown and Leicester wethers; the judges divided equally on the pair, and there arose a deadlock. Neither would move, so the key was found in Mr. Ballard, of Vermont, who decided in favor of the Southdown as being the more profitable to both butcher and consumer. At a Fat Stock Show where the contestants' ultimate fate should be the block, the proper view was no doubt taken.

SWINE.

Swine made a good record as regards numbers, being considerably in advance over previous years. This no doubt must be attributed in a measure to the extra classes provided, viz, those for sow or barrow over six months and for three bacon pigs in all the pure bred classes, while the specials given by the pork packers for six lean singers, as well as another for five ideal singers, brought out an exhibit that was quite an eye-opener as to what the market requires.

Berkshires in the *aged class, nine to fifteen months*, J. G. Snell had the only entries; they were big smooth hogs. The section for *six and under nine months*, produced four entries. J. G. Snell won all the money prizes with T. A. Cox fourth. *Sows, nine months and under fifteen*, J G. Snell again took first with a long good one; she ultimately captured sweepstake honors for "best animal in the swine department". She was smooth and carried plenty of side meat, not all shoulders and hams, as so many show yard candidates of late have affected Geo. Green was second and third with an extra pair. T. A. Cox fourth. The next, that for *six and under nine months*, was possibly the strongest of the Berkshire classes. Thirteen entries faced the judges, and eventually they were sorted as follows: Green first, third and fourth places, while J. G. Snell got second and fifth. Geo. Green's were exceptionally good being long, smooth, and deep; they were the same that he showed so successfully in the "under six months old' classes at Toronto, London, and Ottawa. *Sow or barrow under six months*, J. G. Snell captured first and second; T. A. Cox third, and Geo. Green fourth and fifth. *Three, the produce of one sow.* In this class Geo. Green was an easy first with the lot previously mentioned; J. G. Snell second and third. *For three bacon pigs*, Geo. Green first and third, J. G. Snell second, but they were all too fat and heavy for the ideal hog.

Yorkshires were well brought out. J. E Brethour, Jos. Featherston, H. Deddels, and A. Frank & Sons were the names to be found in the catalogue, and that of the former appears so often in the prize list that it is a relief to write another. *Barrows under fifteen months.* Six put in an appearance and a very strong class they were, J. E. Brethour winning first and third, second and fourth going to Jos. Featherston. *Barrows, under nine months*, had but four entries, but they were exceptionally good, J. E. Brethour winning first and third, and H. Deddels second with an excellent pig. Some critics would have placed J. E. Brethour's third prize pig first, but others maintained that there was more Yorkshire character in the winner, hence the decision. *Sows under fifteen*, was another strong class and the winner added another victory to the credit of Oak Lodge Diamond through his daughter Victoria who rightly deserved the place of honor being long, deep, smooth and of excellent quality. She was followed by another Burford entry while Jos. Featherston captured third. *Under nine months.* Six faced the judges and they finally ordered the red to Deddels, the blue to J. E. Brethour, and Frank & Sons were third. *Barrow or sow under six months.* H. Deddels first, J. E. Brethour second and third *Three, the offspring of one sow* J. E. Brethour first and second Jos. Featherston third. *Three best bacon pigs* were ranked J. E. Brethour, H. Deddels, Jos. Featherston, as in order.

Chester Whites were a fair lot and the prizes were pretty well distributed amongst the following well known breeders, R. H. Harding, Thos George, D. DeCourcey, Wm. Butler & Son, and G. Snyder. *Barrow, nine months and under fifteen.* Thos. George scored first blood, R. H. Harding second ; Wm. Butler & Son third. *Under nine months,* the awards were Wm. Butler & Son first, R. H. Harding second, and D. DeCourcey third. *Sow, nine months and under fifteen,* introduced quite a good one in Wm. Butler & Sons' first prize winner ; second went to D. DeCourcey, and third to Thos. George. *Sow under nine months* R. H. Harding showed a very promising one, winning first ; D. DeCourcey second with one close up, and Wm. Butler & Son had to be satisfied with third. *Barrows or sows under six months,* brought out a strong class, nine entries appealing to the bench for their vote and influence. Finally D. DeCourcey was placed first, G. Snyder second ; and Wm. Butler & Son third ; D. DeCourcey repeating his success in next class of produce of one sow, while *for three bacon pigs* the verdict was Butler & Son first and R. H. Harding second.

Poland Chinas require but little comment as the competition was limited to two exhibitors, viz., Messrs. W. M. & J. C. Smith and W. & H. Jones. The prize list will give the correct placing of awards.

Suffolks and Essex may be dismissed in the same summary manner. There were only two contestants, Messrs. Featherston and A. Frank & Son ; the prize list will give all information and rating of the several entries.

Tamworths. These red fellows, whose breeders claim they are *par excellence* the bacon pig, made a better showing than last year, the principal exhibitors being A. Elliott, Thos George and N. Blain. The former won first for sow under nine months, also for barrow and sow under nine months, also for offspring of sow, Thos. George winning all the other premiums.

Duroc Jerseys were represented by Messrs. Wm. Butler & Son and Tape Bros. The latter had a bit the best of the controversy when points were counted at the conclusion of argument, while J. Park & Son won the honors in class for bacon pigs. These sandy colored hogs are evidently good feeders and are gaining friends.

Grades and Crosses. This menagerie class requires no comment ; the prize list will supply as much information as your reporter could gather. That there were some good specimens goes without saying. A report to be of value on these classes should give breeding, age and weight, but it was impossible to get any of the three with any degree of certainty. If the Smithfield rules could be adopted, and a large card tacked up in each stall and pen giving age, breeding, owner and weight, what a blessing it would be all round. The reporter would think the millenium had arrived, the exhibitors would feel a relief from being expected to answer from early morn to "lights out" the stereotyped question, "Say Mister, how old is he ? What's he weigh ?—and the one unacquainted with live stock could gain information as to breeds, etc., without being compelled to ask often seemingly foolish questions.

Bacon Pigs. When the packers reported that there were only two lots of pigs that answered the requirements of the trade, and that the others were unworthy of having prizes awarded to them, there came near being a rebellion in that part of the show, and to quiet the disturbance the regular judges were instructed to award the premiums. Let us hope that the lesson sought to be taught by the packers may bear fruit. When we mention that Mr. C. O. L. Wilson, of the Ingersoll Packing Co., and Mr. Chester Fearman, of Hamilton, were the judges, no one will dispute but that they knew what they were about, and knew just the article their trade requires They are not making the demand for lean meat, but catering to a demand that must have it, and not only that but are willing to pay an extra price to secure it. For the special offered by the Ingersoll Packing Co. for *six best lean singers*, first was awarded to O. J. Benedict for a pen of six Tamworths ; second to T. Good for pen of Tamworth grades. For the special offered by F. W. Fearman for five bacon hogs that will meet the requirements of the packing industry as ideal singers suitable for export trade, J. E. Brethour was awarded first for pen of Yorkshires, and Wm. Butler & Son second for Duroc Jerseys.

DAIRY.

The exhibit in this department of the show yearly increases in interest, and we only regret we had not the time to devote to it that its merits deserve. There were a number of cows that were worthy of a more extended description than the length of this paper will allow. The names of some are so familiar in our prize rings as to have become household words.

There were fifty-eight entries in the Dairy Department, comprising Holsteins, Jerseys, Ayrshires, Guernseys and Grades. Milking competition extended over forty-eight hours, owners of cows being allowed to milk two or three times daily as desired. Thirteen cows were milked twice and twenty-one three times, daily. The competition started at 1 p.m. on the 7th and closed at 6 a.m. on the 9th.

SCALE OF POINTS USED IN JUDGING.

Twenty points for constitution and conformation.

One point for each pound of milk.

Twenty points for each pound of fat.

Four points for each pound of solids not fat.

One point for each ten days in milk after first twenty days. (Limit, 200 days).

Ten points to be deducted from the total score for each per cent. of fat below three per cent. in the milk.

The following five cows made the highest scores,—the Holstein, "Calamity Jane, carrying off the sweepstakes for the best cow at the show :

—	Lbs. milk.	Lbs. fat.	Lbs. solids not fat.	Total score.
1. Calamity Jane (Holstein), A. & G. Rice, Curries.	166½	4.66	14.65	335.84
2. Fancy of Oakland (Jersey), J. H. Smith & Sons, Highfield.	115	5.40	10.83	301.32
3. Fanny F. (Holstein), Jas. Rettie, Norwich	154½	3.63	12.42	282.28
4. Aaltje Posch (Holstein), Jas. Rettie.	123	4.37	11.24	271 36
5. Waterloo Daisy (Shorthorn), F. Martindale, York	104¼	4.07	9.55	242.35

Prize List.

——	Lbs. milk.	Lbs. fat.	Lbs. solids not fat.	Total score.
Shorthorns over three years.				
1. F. Martindale, York	104¼	4.07	9.55	242.35
Ayrshires over three years.				
1. J. R. Alexander, Brantford	76½	3.06	7.22	176.58
2. W. M. & J. C. Smith, Fairfield Plains	69	2.69	6.48	173.62
3. N. Dyment, Clappison's Corners	59	5 07	5.07	166.88
4. R. S. Brooks, Brantford	68	6 03	6 03	163.02
Ayrshires under three years.				
1. N. Dyment, Clappison's Corners	65½	2.55	6.09	172 46
2. W. M. & J. C. Smith	69½	2.78	6.64	170 66
3. R. S. Brooks	26	1.58	3.42	98.98
Holsteins over three years.				
1. A. & G. Rice, Curries	166½	4.66	14.65	335 84
2. Jas. Rettie, Norwich	154½	3.63	12 42	282 28
3. Jas Rettie	123	4.37	11.24	271.36
4. A. & G. Rice	108½	3.42	9.63	241.62
Holsteins under three years.				
1. G. W. Clemons, St. George	87¼	2.88	7.24	197.61
2. G. W. Clemons	83¾	2.97	7 03	191 07
3. A. & G. Rice	78½	2.43	6.68	177.92
4. A. & G. Rice	77¼	2.49	6 91	169.49
Jerseys over three years.				
1. J. H. Smith & Son, Highfield	115	5 40	10.83	304 32
2. J. H. Smith & Son, Highfield	72½	3.55	6.91	211.94
3. J. H. Smith & Son. Highfield	58¾	2.70	5.53	172.97
Jerseys under three years.				
1. T. H. Dent, Woodstock	47½	2.28	4.67	130.48
Guernseys over three years.				
1. Wm. Butler & Sons, Dereham Centre	30¼	1.45	2.93	117.97
2. Wm. Butler & Sons	34¼	1.47	3.32	97.73
Guernseys under three years.				
1. Wm. Butler & Sons	24½	1.38	2.48	100.02
Grades over three years.				
1. Wm. Temple Thompson, Rockton	102½	3.28	9.06	231.14
2. T. H. Dent, Woodstock	103¾	3.22	9.31	227 09
3. F. Martindale, York	98½	3.69	9.47	226.18
4. T. H. Dent	93	3.16	8.47	213.48
5. J. R. Alexander, Brantford	71¾	2.65	6.41	175.29
Grades under three years.				
1. H. McDougal, Guelph	72½	3.00	6.68	180.22
2. Jas. Rettie, Norwich	64½	2.13	6.06	152.64

Sweepstakes.

Cow over three years—A. & G. Rice, Curries.

Cow under three years—G. W. Clemons, St. George.

Test made by W. J. PALMER, B.S.A., Toronto, Ont., assisted by A. C. WILSON, B.S.A., Greenway, Ont.

LIST OF PRIZE WINNERS.

CATTLE.

SHORTHORNS.

Steer, two years and under three. Two entries.

1. H. & W. Smith, Hay.—Bruce, 21774.
2. James Leask, Greenbank.—Indian Chieftain.

Steer, one year and under two. Six entries.

1. H. & W. Smith, Hay.—Bannockburn, 23766.
2. A. & F. Bolton, Armstrong's Mills.—Barnie, 23693.
3. James Rennie, Wick.—Bob.

Highly commended. James Oke, Alvinston.—Roan Duke, 23781.
Commended. Malcolm Rennie, New Hamburg.—Robbie Burns.

Steer, under one year. Four entries.

1. J. Fried & Son, Roseville.—Honest Billy.
2. H. & W. Smith, Hay.—Free Trade, 25691.
3. James Oke, Alvinston.—Dandy.

Highly commended. James Rennie, Wick.—Valasco Pride.

Cow or Heifer, three years and over. Two entries.

1. J. Fried & Sons, Roseville.—Blenheim Cherry, 21756.
2. D. Milloy, Paris.—Joan 8th.

Heifer, two years and under three. Three entries.

1. James Rennie, Wick.—Lily of Layton.
2. D Milloy, Paris.—Red Empress 3rd.
3. D. Milloy, Paris.—Roan Duchess 63rd.

Heifer, under two years. Two entries.

1. John Fried & Sons, Roseville.—Roan Lily.
2. Jas. Oke, Alvinston.—Lily of Alvinston.

SPECIAL PRIZES BY DOMINION SHORTHORN BREEDERS' ASSOCIATION.

Prizes for steers were duplicated by the Dominion Shorthorn Breeders' Association.

HEREFORDS AND POLLED ANGUS.

Steer or Heifer, two years and under three. Six entries.

1. W. A. Rinehart, Buffalo, N. Y.—Jack.
2. F. W. Stone Estate, Guelph.—Royal.
3. H. D. Smith, Compton, Que.—Bouham.

Highly commended. John Rutherford & Son, Roseville.—Billy, 260.
Commended. Walter Hall, Washington,—Newtona Favorite, 277.

Steer or Heifer, one year and under two. Four entries.

1. H. D. Smith, Compton, Que.—Fairy of I.
2. Jas. Bowman, Guelph.—Ian of Tweedhill, 933.
3. F. W. Stone Estate, Guelph.—Rupert.

Highly commended. F. W. Stone Estate, Guelph.—Spruce.

Steer or Heifer, under one year. Four entries.

1. Walter Hall, Washington.—Robin, 325.
2. Jas. Bowman, Guelph.—Kyma 5th.
3. Jas. Bowman, Guelph.—Belle of Elm Park.

Highly commended. F. W. Stone Estate, Guelph.

Cow or Heifer, three years and over. Three entries.

1. Jas. Bowman, Guelph.—Mysie 2nd of Verulam, 5354.
2. Jas. Bowman, Guelph.—Kyma of Tweedhill, 17606.
3. Jas. Bowman, Guelph.—Kyma 2nd, 18920.

GALLOWAYS AND DEVONS.

Steer or Heifer, two years and under three. Three entries.

1. D. McCrae, Guelph.—College Bright Eyes, 10959.
2. W. J. Rudd, Eden Mills.—Bounce.
3. W. J. Rudd, Eden Mills.—Bruce.

Steer or Heifer, one year and under two. Four entries.

1. W. J. Rudd, Eden Mills.—Tip.
2. W. J. Rudd, Eden Mills.—Turby.
3. D. McCrae, Guelph.—Cleo, 11916.

Highly commended, D. McCrae, Guelph.—Semiramis Hanna, 12798.

Steer or Heifer, under one year. Two entries.

1. D. McCrae, Guelph.—Maid Minnie, 12959.
2. D. McCrae, Guelph.— .

Cow or Heifer, three years and over. Two entries.

1. W. J. Rudd. Eden Mills.—Maud, 107.
2. A. M. & Robt. Shaw, Brantford.—Rosie McErin, 8507.

GRADES AND CROSSES OF ANY BREED.

Steer, two years and under three. Ten entries.

1. John Fried & Sons, Roseville.—Look Me Over.
2. Jas. Rennie, Wick.—Pilot.
3. Peter Marshall, Ayr.—Scotty (Hereford).

Highly commended, Jas. Leask, Greenbank.—Jack.
Commended, Walter Robson, Washington.— .

Steer, one year and under two. Five entries.

1. John Campbell, Woodville.— .
2. John Campbell, Woodville.— .
3. James Leask, Greenbank.—Jumbo.

Highly commended, Walter Robson, Washington.—(Hereford).
Commended, James Rennie, Wick.—Captain.

Steer, under one year. Eight entries.

1. James Leask, Greenbank.—Bob.
2. H. D. Smith, Compton, Que.—Sarnia's Calf (Hereford).
3. John Campbell, Woodville.— .

Highly commended, J. Fried & Sons, Roseville.—Sandy.

Cow or Heifer, three years and over. Nine entries.

1. James Oke, Alvinston.—Maud.
2. James Bowman, Guelph.—Cherry of Elm Park.
3. James Rennie, Wick.—Betsy Ann.

Highly commended, James Oke, Alvinston.—Red Rose.
Commended, James Leask, Greenbank.—Polley.

Heifer, two years and under three. Five entries.

1. James Oke, Alvinston.—Morriston Lassie.
2. James Leask, Greenbank.—Lady Money.
3. James Leask, Greenbank.—Tib.

Highly commended, James Oke, Alvinston.—Sweet Heart.
Commended, Alex. Edmondson, Brantford.— .

Heifer, under two years. Five entries.

1. James Oke, Alvinston.—Mina.
2. J. Fried & Sons, Roseville.—Snowflake.
3. H. D. Smith, Compton, Que.—Lady Dunham 22nd (Hereford).

Highly commended, James Leask, Greenbank.—Twin.
Commended, Wm. Oliver, Avonbank.

Prizes for grades and crosses, won by Grade Herefords, sired by a registered Hereford bull (name and number of bull to accompany entry), were increased twenty-five per cent. by H. D. Smith, of Compton, Que.

Special, by the Dominion Shorthorn Breeders' Association, for best grade steer, sired by a pure bred Shorthorn bull. Four entries. Prize, J. Fried & Sons, Roseville.

For best animal shown in the Cattle Department.

Prize, a "Maple Leaf" Grain Grinder, donated by Goold, Shapley & Muir Co., Brantford, Ontario, manufacturers of grain grinders, wind mills, fanning mills, etc. Ten entries.

In case a pure bred Hereford or Hereford Grade won the championship prize, $25 was offered by the Canadian Hereford Breeders' Association.

In case a Hereford or Hereford Grade, with at least two registered crosses, won the championship prize, $50 extra was offered by H. D. Smith, Esq., of Compton, Que.

Prize, H. & W. Smith, Hay, Bruce, 21774. (Shorthorn.)

SHEEP.

Cotswold Ewe, one year and under two. Four entries.

1. John Park & Son, Burgessville, Eveline, 12289.
2. John Park & Son, Burgessville, Heather Blossom, 12292.
3. Geo. Allen, Oriel, Ficht 46, 12903.

Highly commended, John Park & Son, Burgessville, Florist, 12293.

Cotswold Ewe, under one year. Seven entries.

1. John Park & Son, Burgessville, Mayflower, 14345.
2. J. G. Snell, Snelgrove, Snell's Ewe 88, 14529.
3. John Park & Son, Burgessville, Norfolk Maid, 14348.

Highly commended Geo Allen, Oriel, Ficht 79, 13806.
Commended, John Park & Son, Burgessville, Minna Belle, 13649.

Cotswold Wether, one year and under two. Four entries.

1. John Rutherford & Son, Roseville, Oxford Pride B, 12296.
2. John Park & Son, Burgessville, Curly Tom, 12294.
3. John Rutherford & Son, Roseville, Oxford Pride C, 12297.

Highly commended, Wm. E. Wright, Glanworth, Dick, 12176.

Cotswold Wether, under one year. Five entries.

1. W. E. Wright, Glanworth, Mage, 14290.
2. John Park & Son, Burgessville, Silky, 14351.
3. John Park & Son, Burgessville, Goldwinner, 14347.

Highly commended, Wm. E. Wright, Glanworth, Shore, 134. 14413.
Commended, John Park & Son, Burgessville, Corn Cracker, 13648.

Cotswolds, three Wethers, under one year. Three entries.

1. John Park & Son, Burgessville.
2. Wm. E. Wright, Glanworth.
3. John Park & Son, Burgessville.

Cotswolds, three Ewes, under one year. Five entries.

1. John Park & Son, Burgessville.
2. J. G. Snell, Snelgrove.
3. John Park & Son, Burgessville.

Highly commended, Geo. Allen, Oriel.

Lincoln Ewe, one year and under two. Four entries.

1. Gibson & Walker, Denfield, G. & W., 2371.
2. Wm. Oliver, Avonbank, 2409.
3. Gibson & Walker, Denfield, Sadie E., 3010.

Highly commended, Wm. Oliver, Avonbank, 2412.

Lincoln Ewe, under one year. Nine entries.

1. Gibson & Walker, Denfield, G. & W. 203, 3249.
2. Gibson & Walker, Denfield, G. & W. 313, 3205.
3. Gibson & Walker, Denfield, G. & W. 3206.

Highly commended, Wm. Oliver, Avonbank, 3299.
Commended, Wm. Oliver, Avonbank, 4035.

Lincoln Wether, one year and under two. Three entries.

1. Gibson & Walker, Denfield, Wether No. 1, 2783.
2. Gibson & Walker, Denfield, Wether No. 4, 2787.
3. John Rutherford & Son, Roseville, Grey Billy, 2792.

Lincoln Wether, under one year. Six entries.

1. Gibson & Walker, Denfield, Rightside, 3909.
2. Gibson & Walker, Denfield, Model, 3912.
3. Gibson & Walker, Denfield, Patchen, 3914.

Highly commended, Gibson & Walker, Denfield, Sunrise, 3911.

Lincolns, three Wethers, under one year. Two entries.

1. Gibson & Walker, Denfield.
2. Gibson & Walker, Denfield.

Lincolns, three Ewes, under one year. Three entries.

1. Gibson & Walker, Denfield.
2. Wm. Oliver, Avonbank.
3. Gibson & Walker, Denfield.

Leicester Ewe, one year and under two. Four entries.

1. Wm. A. Rennie, Shakespeare, Royal Olive, 1580.
2. Whitelaw Bros., Guelph, Kate III, 1553.
3. Wm. A. Rennie, Shakespeare, Royal Nell, 1577.

Highly commended, Orr & Lillico, Galt, Nettie Orr, 1560.

Leicester Ewe, under one year. Seven entries.

1. Wm. A. Rennie, Shakespeare, Maggie M., 1940.
2. Orr & Lillico, Galt, Annie Orr, 1864.
3. Orr & Lillico, Galt, Lady Orr, 1863.

Highly commended, Whitelaw Bros., Guelph, Bet 3rd, 1853.
Commended, Wm. A. Rennie, Shakespeare, Lusie R., 1943.

Leicester Wether, one year and under two. Four entries.

1. John Kelly, Shakespeare, Duncan K., 1694.
2. Orr & Lillico, Galt, Bruce Orr, 1559.
3. Orr & Lillico, Galt, Geordy Orr, 1558.

Highly commended, John Kelly, Shakespeare, Donald K., 1695.

Leicester Wether, under one year. Four entries.

1. Orr & Lillico, Galt, Jim Orr, 2203.
2. Orr & Lillico, Galt, Champion Orr, 2202.
3. Orr & Lillico, Galt, Jack Orr, 2201.

Highly commended, John Rutherford & Son, Roseville, Lord Roseville, 2144.

Leicesters, three Wethers, under one year. One entry.

Prize, Orr & Lillico, Galt, Champion Orr, 2202 ; Jim Orr, 2203 ; Jack Orr, 2201.

Leicesters, three Ewes, under one year. Three entries.

1. Orr & Lillico, Galt, Lady, 1863 ; Annie, 1864 ; Bess, 1865.
2. Wm. A. Rennie, Shakespeare.
3. Whitelaw Bros., Guelph, Bet 3rd, 1853 ; Bonnie Bess 6th, 1852 ; Primrose, 1848.

Oxford Ewe, one year and under two. Nine entries.

1. Smith Evans, Gourock, Evans' 221, 12421.
2. E. Turner, Burford, Burford Queen 6th, 14637.
3. J. H. Jull, Mt. Vernon, Brant Queen 35, 12857.

Highly commended, E. Turner, Burford, Burford Queen 3rd, 14635.
Commended, Smith Evans, Gourock, Evans' 236, 12426.

Oxford Ewe, under one year. Six entries.

1. Smith Evans, Gourock, Evans' 280, 13790.
2. Smith Evans, Gourock, Evans' 279, 13789.
3. Smith Evans, Gourock, Evans' 272, 13797.

Highly commended, J. H. Jull, Mt. Vernon, Brant Queen 65, 13911.
Commended, J. H. Jull, Mt. Vernon, Brant Queen 74, 13908.

Oxford Wether, one year and under two. Four entries.

1. W. H. Beattie, Wilton Grove, Pond Mills, 13348.
2. J. H. Jull, Mt. Vernon, Brant Boy 1st, 13120.
3. J. H. Jull, Mt. Vernon, Brant Boy 2nd, 13121.

Highly commended, John Rutherford & Son, Roseville, Oxford Pride, 14702.

Oxford Wether, under one year. Eight entries.

1. Wm. E. Wright, Glanworth, Wright's 458, 14701.
2. Wm. E. Wright, Glanworth, Elliott's 13, 14697.
3. Wm. E. Wright, Glanworth, Elliott's 12, 14696.

Highly commended, J. H. Jull, Mt. Vernon, Brant Boy 78, 14687.
Commended, John Rutherford, Roseville, Roseville Boy.

Oxfords, three Wethers, under one year. Three entries.

Prize, Wm. E. Wright, Glanworth.

Oxfords, three Ewes, under one year. Three entries.

1. Smith Evans, Gourock, Evans' 293, 13779; Evans' 276, 13786; Evans' 271, 13775.
2. J H. Jull, Mt. Vernon, Brant Queen, 65; Brant Queen, 71; Brant Queen, 74.
3. Smith Evans, Gourock, Evans' 280, 13790; Evans' 279, 13789; Evans' 272, 13797.

Shropshire Ewe, one year and under two. Four entries.

1. John Campbell, Woodville, Campbell's 619, 99649.
2. D. G. Hanmer & Sons, Mt Vernon, Hanmer's 452, 97453.
3. D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 439, 97460.

Highly commended, D. G. Hanmer & Sons, Mt. Vernon, Phinn's 517, 88395.

Shropshire Ewe, under one year. Thirteen entries.

1. D. G. Hanmer & Sons, Mount Vernon, Hanmer's 531, 99471.
2. John Campbell, Woodville, Campbell's 732, 99646.
3. D. G. Hanmer & Sons, Mount Vernon, Hanmer's 527, 99467.

Highly Commended, D. G. Hanmer & Sons, Mount Vernon, Hanmer's 585, 103659.
Commended, D. G. Hanmer & Sons, Mount Vernon, Hanmer's 586, 103660.

Shropshire Wether, one year and under two. Nine entries.

1. D. G. Hanmer & Sons, Mount Vernon, Hanmer's 427, 93098.
2. W. H. Beattie, Wilton Grove, Beattie's 554, 92309.
3. John Campbell, Woodville, Todd's 663, 89152.

Highly Commended, R. Gibson, Delaware, Grazier, 92260.
Commended, W. H. Beattie, Wilton Grove, Beattie's 556, 92311.

Shropshire Wether, under one year. Thirteen entries.

1. R. Gibson, Delaware, Horatio, 99716.
2. W. H. Beattie, Wilton Grove, Beattie's 611, 99957.
3. John Campbell, Woodville, McWilliam's 100, 101880.

Highly Commended, Wm. E. Wright, Glanworth, Wright's 192, 103048.
Commended, R. Gibson, Delaware, Home Ruler, 99717.

Shropshires, three Wethers, under one year. Five entries.

1. R. Gibson, Delaware, Horatio, 99716; Hero (4), 99715; Home Ruler, 99717.
2. W. H. Beattie, Wilton Grove, Beattie's 609, 99955; Beattie's 610, 99956; Beattie's 611, 99957.
3. Wm. E. Wright, Glanworth, Wright's 190, 103046; Wright's 191, 103047; Wright's 192, 103048.

Shropshires, three Ewes, under one year. Three entries.

1. D. G. Hanmer & Sons, Mount Vernon, Hanmer's 531, 99471; Hanmer's 527, 99467; Hanmer's 585, 103659.
2. D. G. Hanmer & Sons, Mount Vernon, Hanmer's 493, 99455; Hanmer's 416, 99452; Hanmer's 496, 99457.
3. John Campbell, Woodville, Campbell's 730, 99645; Campbell's 732, 99646; Campbell's 734, 99647.

Southdown Ewe, one year and under two. Seven entries.

1. John Jackson & Sons, Abingdon, Jackson Ewe, 12B, 9389.
2. A. Telfer & Sons, Paris, Annie Laurie 9805.
3. John Jackson & Sons, Abingdon, Jackson Ewe 7B, 8387.

Highly Commended, T. C. Douglas, Galt, Douglas Ewe 69, 9401.
Commended, A. Telfer & Sons, Paris, Annie Bell, 9804.

Southdown Ewe, under one year. Eleven entries.

1. John Jackson & Sons, Abingdon, Jackson Ewe 22B, 10248.
2. A. Simenton & Son, Blackheath, Simenton Ewe 75, 10156.
3. A. Simenton & Son, Blackheath, Simenton Ewe 84, 10373.

Highly Commended, John Jackson & Sons, Abingdon, Jackson Ewe 29B, 10252.
Commended, Geo. Baker & Son, Simcoe, Baker Ewe 46, 10445.

Southdown Wether, one year and under two. Eight entries.

1. W. H. Beattie, Wilton Grove, Champion, 9514.
2. R. Gibson, Delaware, A 2, 9520.
2. T. C Douglas, Galt, A 1, 9527.

Highly Commended, W. H. Beattie, Wilton Grove, Patsy, 9549.
Commended, T. C. Douglas, Galt, A III, 9529.

Southdown Wether, under one year. Twelve entries.

1. A. Simenton & Son, Blackheath, Simenton Wether 3, 10370.
2. Geo. Baker & Son, Simcoe, Mutton Maker 4, 10440.
3. A. Telfer & Sons, Paris, Pat, 10430.

Highly Commended, A. Simenton & Son, Blackheath, Simenton Wether 4, 10371.
Commended, A. Simenton & Son, Blackheath, Simenton Wether 5, 10372.

Southdowns, three Wethers, under one year. Six entries.

1. A Simenton & Son, Blackheath, Simenton Wether 3, 10370 ; Simenton Wether 4, 10371 ; Simenton Wether 5, 10372.
2. A. Telfer & Sons, Paris, Pat, 10430 : Jake, 10438 , Mike, 10429.
3. T. C. Douglas, Galt, B I, 10447 ; B II, 10438 ; B III, 10449.
Highly Commended, Geo. Baker & Son, Simcoe.
Commended, John Jackson & Sons, Abingdon, Albert, 10422 ; Alf, 10423 ; Andy, 10424.

Southdowns, three Ewes, under one year. Five entries.

1. A. Simenton & Son, Blackheath, Simenton Ewe 75, 18156 ; Simenton Ewe 84, 10373 ; Simenton Ewe 82, 10163.
2. John Jackson & Sons, Abingdon, Jackson Ewe 22B, 10248 ; Jackson Ewe 29B, 10252 ; Jackson Ewe 33B, 10425.
3. T. C. Douglas, Galt, Douglas Ewe 81, 10257 ; Douglas Ewe 82, 10258 ; Douglas Ewe 83, 10259.
Highly Commended, Geo. Baker & Son, Simcoe.
Commended, A. Telfer & Sons, Paris, Telfer Ewe 66, 10431 ; Telfer Ewe 68, 10433 ; Burgess Ewe 19, 10479.

Dorset Horns and Merinos, Ewe, one year and under two. Three entries.

1. R H. Harding, Thorndale, Harding's 77, 489.
2. R. H. Harding, Thorndale, Harding's 74, 486.
3. R. H. Harding, Thorndale, Harding's 75, 488.

Dorset Horns and Merinos, Ewe, under one year. Four entries.

1. R. H. Harding, Thorndale, Harding's 92, 519.
2. Wm. E Wright, Glanworth, Birdie, 521.
3. R. H. Harding, Thorndale, Harding's 97, 542.
Highly Commended, Wm. E. Wright, Glanworth, Bowman's 6, 536.

Dorset Horns and Merinos, Wether, one year and under two. Three entries.

1. R. H. Harding, Thorndale, Harding's 88, 498.
2. R. H. Harding, Thorndale, Harding's 69, 497.
3. R. H. Harding, Thorndale, Great Expectations, 6311.

Dorset Horns and Merinos, Wether, under one year. Four entries.

1. R. H. Harding, Thorndale, Rothschild, 541.
2. R. H. Harding, Thorndale, Baron, 540.
3. R. H. Harding, Thorndale, Surprise, 515.
Highly Commended, John Rutherford & Son, Roseville, O.A.C. 318, 539.

Hampshires and Suffolks, Ewe, one year and under two. Three entries.

1. John Kelly, Shakespeare, Wildy, 3216.
2. John Kelly, Shakespeare, Black Girl, 3215.
4. W. J. Rudd, Eden Mills.

Hampshires and Suffolks, Ewe, under one year. Two entries.

1. John Kelly, Shakespeare, Daybreak, 3893.
2. W. J. Rudd, Eden Mills.

Hampshires and Suffolks, Wether, one year and under two. Four entries.

1. John Rutherford & Son, Roseville, James II, 1263.
2. W. H. Beattie, Wilton Grove, Goble's 4, 1245.
3. R. Gibson, Delaware, Goble's 25, 1246.

Hampshires and Suffolks, Wether, under one year. Three entries.

1. W. J. Rudd, Eden Mills.
2. W. J. Rudd, Eden Mills.
3. W. J. Rudd, Eden Mills.

Sweepstake for the best sheep exhibited at the show. Prize, a plow, donated by the Wilkinson Plow Co., Ltd., Toronto, manufacturers of plow, scrapers and wheelbarrows. The winner to choose any walking plow made by this company.

1. W. H. Beattie, Wilton Grove, Champion, 9514.

SHROPSHIRE SPECIALS.

Prizes offered by the American Shropshire Record Association.

Grand Sweepstakes Premium of the Show if won by registered Shropshire Sheep. Prize, $50.

Shropshire Wether, one year and under two. Seven entries.

1. D. G. Hanmer & Sons, Mount Vernon.
2. W. H. Beattie, Wilton Grove.

Shropshire Wether, under one year. Eight entries.

1. R. Gibson, Delaware, Horatio, 99716.
2. W. H. Beattie, Wilton Grove.

Shropshires, three Wether Lambs. Five entries.

1. R. Gibson, Delaware, Horatio, 99716; Hero (4), 99715; Home Ruler, 99717.
2. W. H. Beattie, Wilton Grove, Beattie's 609, 99955; Beattie's 610, 99956; Beattie's 611, 99957.

Shropshire Wether, sired by registered Shropshire, ram out of grade ewe, one year and under two. Six entries.

1. D. G. Hanmer & Sons, Mount Vernon.
2. John Rutherford & Son, Roseville.

Shropshire Wether, sired by registered Shropshire ram out of grade ewe, under one year. Eight entries.

1. John Campbell, Woodville.
2. W. H. Beattie, Wilton Grove.

SOUTHDOWN SPECIALS.—BY THE AMERICAN SOUTHDOWN BREEDERS' ASSOCIATION.

Southdown pen of four lambs, two rams and two ewes, bred and owned by exhibitor. Three entries.

Prize, the first five volumes of the American Southdown Record.

1. John Jackson & Sons, Abingdon, Jackson I, 10244; Jackson III, 10245; Jackson Ewe 22B, 10248; Jackson Ewe 29B, 10252.

Grades and Crosses, Ewe, one year and under two. Six entries.

1. John Campbell, Woodville.
2. John Campbell, Woodville.
3. E & N. Parkes, Oriel.

Highly Commended, Wm. Oliver, Avonbank.
Commended, Gibson & Walker, Denfield.

Grades and Crosses, Wether, one year and under two. Eight entries.

1. D. G. Hanmer & Sons, Mount Vernon.
2. John Rutherford & Son, Roseville.
3. W. H. Beattie, Wilton Grove.

Highly Commended, John Campbell, Woodville.
Commended, Gibson & Walker, Denfield.

Grades and Crosses, three Wether, under one year. Eight entries.

1. Orr & Lillico, Galt.
2. Wm. Oliver, Avonbank.
3. John Kelly, Shakespeare.

Highly Commended, John Campbell, Woodville.
Commended, R. Gibson, Delaware.

Grades and Crosses, Wether, under one year. Twenty-one entries.

1. Wm. Oliver, Avonbank.
2. Orr & Lillico, Galt.
3. Wm. Oliver, Avonbank.

Highly Commended. Orr & Lillica, Galt.
Commended, John Kelly, Shakespeare.

Grades and Crosses, Ewe, under one year. Nineteen entries.

1. John Rutherford & Son, Roseville, Nit.
2. Gibson & Walker, Denfield, Susan.
3. Orr & Lillico, Galt, Kate.

Highly Commended, John Campbell, Woodville.
Commended. W. H. Beattie, Wilton Grove.

Grades and Crosses, Sheep, under two years. Seven entries.

1. John Campbell, Woodville.

Highly Commended, D. G. Hanmer & Sons, Mt. Vernon.
Commended, John Rutherford & Son, Roseville.

SWINE.

Berkshire Barrow, nine months, and under fifteen. Three entries.

1. J. G. Snell, Snelgrove, Union Jack, 5102.
2. J. G. Snell, Snelgrove, Good Times, 5100.
3. J. G. Snell, Snelgrove, Leader, 5101.

Berkshire Barrow, six months and under nine. Four entries.

1. J. G. Snell, Snelgrove, Paymaster, 5104.
2. J. G. Snell, Snelgrove, Ringleader, 5105.
3. J. G. Snell, Snelgrove, Flagstaff, 5106.
Highly commended, Thos. A. Cox, Brantford, Nimble Dick, 5124.

Berkshire Sow, nine months and under fifteen. Four entries.

1. J. G. Snell, Snelgrove, Snell's Charmer, 5236.
2. Geo. Green, Fairview, Caro Bell, 5237.
3. Geo. Green, Fairview, Lady Aberdeen, 4851.
Highly Commended, Thos. A. Cox, Brantford, Flora Lee, 5239.

Berkshire Sow, six months and under nine. Eleven entries.

1. Geo. Green, Fairview, Model Lady, 5280.
2. J. G. Snell, Snelgrove, Snell's Highclere 12th, 5242.
3. Geo. Green, Fairview, Victor Lady, 5279.
Highly Commended, Geo Green, Fairview, Countess, 5281.
Commended, J. G. Snell, Snelgrove, Snell's Highclere 13th, 5560.

Berkshire Sow, or Barrow, under six months. Six entries.

1. J. G. Snell, Snelgrove, Jewell, 5563.
2. J. G. Snell, Snelgrove, Primrose, 5564.
3. Thos. A. Cox, Brantford, Happy Boy, 5125.
Highly Commended, Geo. Green, Fairview, Green's Shapely 2nd, 5524.
Commended, Geo. Green, Fairview, Green's Shapely 3rd, 5525.

Berkshires, Three Pigs, the offspring of one sow, bred by exhibitor. Four entries.

1. Geo. Green, Fairview.
2. J. G. Snell, Snelgrove, Union Jack, Good Times, Leader.
Highly Commended, J. G. Snell, Snelgrove, Snell's Highclere 12; Snell's Highclere 13, and Ringleader.
Commended, Geo. Green, Fairview.

Berkshires, Three Bacon Pigs. Four entries.

1. Geo. Green, Fairview.
2. J. G. Snell, Snelgrove, Prudence, 5561; Jessamine, 5562, and Realization, 5107.
3. Geo. Green, Fairview.

Yorkshire Barrow, nine months and under fifteen. Six entries.

1. J. E. Brethour, O. L. Pat, 2733.
2. Jos. Featherston, Streetsville, Jumbo 3rd, 2729.
3. J E. Brethour, Burford, O. L. Patron, 2734.
Highly Commended, Jos. Featherston, Streetsville, Jumbo 2nd, 2728.
Commended, Henry Deddles, Kossuth, Tom, 2721.

Yorkshire Barrow, six months and under nine. Four entries.

1. J. E. Brethour, Burford, O. L. Charles, 2736.
2. Henry Deddles, Kossuth, Jim, 2722.
3. J. E. Brethour, Burford. O. L. King, 2735.
Highly Commended, Jos. Featherston, Streetsville, Relay, 2549.

Yorkshire Sow, nine months and under fifteen. Five entries.

1. J. E. Brethour, Burford, O. L. Victoria, 2616.
2. J. E. Brethour, Burford, O. L. Victoria II, 2617.
3. Jos. Featherston, Streetsville, Jessie, 2609.
Highly Commended, J. E. Brethour, Burford, O. L. Gloria, 2783.
Commended, Jos. Featherston, Streetsville, Oxford Lass, 2708.

Yorkshire Sow, six months and under nine. Six entries.

1. Henry Deddles, Kossuth, Mary Ann, 2774.
2. J. E. Brethour, Burford, O. L. Clara 6th, 2784.
3. A. Frank & Son, The Grange, Guelph Beauty, 2634.
Highly Commended, Jos. Featherston, Streetsville, Nancy, 2642.
Commended, Jos. Featherston, Streetsville, Lady Bell, 2643.

Yorkshire Sow or Barrow, under six months. Six entries.

1. Henry Deddles, Kossuth, Katie, 2776.
2. J. E. Brethour, Burford, O. L. Butterfly 5th, 2786.
3. J. E. Brethour, Burford. O L. Butterfly 6th, 2787.
Highly Commended, Jos. Featherston, Streetsville, X Rays, 2782.
Commended, Jos. Featherston, Streetsville, Lendella, 2781.

Yorkshires, Three Pigs, the offspring of one sow, bred by exhibitor. Four entries.

1. J. E. Brethour, Burford, Pat, 2733 ; O. L. Victoria, 2616 ; O. L. Victoria II, 2617.
2. J. E. Brethour, Burford, O. L. King, 2735 ; O. L. Clara 7th, 2785 ; O. L. Clara 6th, 2784.
3. Henry Deddels, Kossuth, Kossuth Prince, 2720 ; Tom, 2721 ; Jim, 2722.

Commended, Jos. Featherston, Streetsville, Relay, 2549 ; Jessie, 2609 ; Hazel, 2610.

Yorkshires, Three Bacon Pigs. Three entries.

1. J. E. Brethour, Burford.
2. Henry Deddels, Kossuth.
3. Jos. Featherston, Streetsville, Lady Bell, X Rays, Lendella.

Chester White Barrow, nine months and under fifteen. Four entries.

1. Thos. George, Mt. Elgin, Look Me Over, 965.
2. R. H. Harding, Thorndale, Heavyweight Champion, 959.
3. Wm. Butler & Son, Dereham Centre, Grand Duke, 964.

Highly Commended, Wm. Butler & Son, Dereham Centre, King George 12th, 963.

Chester White Barrow, six months and under nine. Four entries.

1. Wm. Butler & Son, Dereham Centre, General Weyler, 966.
2. R. H. Harding, Thorndale, Andy, 871.
3. D. DeCourcy, Bornholm, Bruno 970.

Highly Commended, Thos. George, Mt. Elgin, George's Best 4th, 967.

Chester White Sow, nine months and under fifteen. Five entries.

1. Wm. Butler & Son, Dereham Centre, Beulah, 1050.
2. D. DeCourcy, Bornholm, Equity, 977.
3. Thos. George, Mount Elgin, Jessie, 1051.

Highly Commended, R. H. Harding, Thorndale, Plum, 1094.
Commended, Wm. Butler & Son, Dereham Centre, Mary, 1094.

Chester White Sow, six months and under nine. Four entries.

1. R. H. Harding, Thorndale, Princess Maud, 972
2. D. DeCourcy, Bornholm, Canadian Beauty, 1058.
3. Wm. Butler & Son, Dereham Centre, Rose O.K., 1052.

Highly Commended, Wm. Butler & Son, Dereham Centre, Sybil, 1053.

Chester White Sow or Barrow, under six months. Nine entries.

1. D. DeCourcy, Bornholm, Fatty, 1059.
2. Gideon Snyder, Jarvis, Nancy, 1036.
3. Wm. Butler & Son, Dereham Centre, My Pet, 1056.

Highly Commended, Gideon Snyder, Jarvis, May Bell, 1035.
Commended, Gideon Snyder, Jarvis, Anna Lee, 1034.

Chester Whites, Three Pigs, the offspring of one sow, bred by exhibitor. Five entries.

1. D. DeCourcy, Bornholm.
2. Gideon Snyder, Jarvis, Nancy, 1036 ; May Bell, 1035, and Anna Lee, 1034.

Chester Whites, Three Bacon Pigs. Five entries.

1. Wm. Butler & Son, Dereham Centre.
2. R. H. Harding, Thorndale, Elsie 2nd, 1044 ; Ethel, 1045, and Lottie 2nd, 1046.
3. R. H. Harding, Thorndale.

Highly Commended, D. DeCourcy, Bornholm.
Commended, Wm. Butler & Son, Dereham Centre.

Poland China Barrow, nine months and under fifteen. Two entries.

1. W. & H. Jones, Mt. Elgin. Dan, 1067.
2. W. M. & J. C. Smith, Fairfield Plains, Surprise, 1070.

Poland China Barrow, six months and under nine. Two entries.

1. W. & H. Jones, Mt. Elgin, Hardy, 1068
2. W. & H. Jones, Mt. Elgin, Whitney, 1069.

Poland China Sow, nine months and under fifteen. Four entries.

1. W. M. & J. C. Smith, Fairfield Plains, Carry Ida, 1162.
2. W. & H. Jones, Mt. Elgin, Black Flo, 1156
3. W. & H. Jones, Mt. Elgin, Black Countess, 1157.

Highly Commended, W. M. & J. C. Smith, Fairfield Plains, Princess of the Plains, 1142.

Poland China Sow, six months and under nine. Three entries.

1. W. M. & J. C. Smith, Fairfield Plains, Exhibition Girl, 1164.
2. W. & H. Jones, Mt. Elgin, Black Bess 3rd, 1221.
3. W. M. & J. C. Smith, Fairfield Plains, Louisa, 1163.

Poland China Sow or Barrow, under six months. Four entries.

1. W. M. & J. C. Smith, Fairfield Plains, Myrtle, 1227.
2. W. & H. Jones, Mt. Elgin, Queen, 1222.
3. W. & H. Jones, Mt. Elgin, Queen 2nd, 1223.

Highly Commended, W. M. & J. C. Smith, Fairfield Plains, Pat, 1071.

Poland Chinas, Three Pigs, the offspring of one sow. bred by exhibitor. Two entries.

1. W. & H. Jones, Mt. Elgin.
2. W. M. & J. C. Smith, Fairfield Plains.

Poland Chinas, Three Bacon Pigs. Three entries.

1. W. & H. Jones. Mt. Elgin, July Lass, 1224; July Maid, 1225, and August Lass, 1226.
2. W. M. & J. C. Smith, Fairfield Plains.
3. W. M. & J. C. Smith, Fairfield Plains.

Suffolks and Essex, Barrow, nine months and under fifteen. Two entries.

1. Jos. Featherston, Streetsville, Nugget 2nd, 17.
2. Jos. Featherston, Streetsville, Nugget 3rd, 18.

Suffolks and Essex, Barrow, six months and under nine. Four entries.

1. A. Frank & Son, The Grange, Patrick, 243.
2. Jos. Featherston. Streetsville, Jubilee, 16.
3. Jos. Featherston, Streetsville, Jubilee 2nd, 19.

Highly Commended. A. Frank & Son, The Grange, Nero, 242.

Suffolks and Essex, Sow nine months, and under fifteen. Two entries.

1. Jos. Featherston, Streetsville, Black Nancy, 20.
2. Jos. Featherson, Streetsville, Ida's Best, 255.

Suffolks and Essex, Sow six months and under nine. Four entries.

1. Jos. Featherston, Streetsville, Nancy B, 21.
2. Jos. Featherston, Streetsville, Fancy B, 22.
3. A. Frank & Son, The Grange, Caledon Lass, 261.

Highly Commended, A. Frank & Son, The Grange. Juda, 260.

Suffolks and Essex, Sow or Barrow, under six months. Two entries.

1. Jos. Featherston, Streetsville, Dark Beauty, 24.
2. Jos. Featherston, Streetsville, Black Beauty, 23.

Suffolks and Essex, Three Pigs, the offspring of one sow, bred by exhibitor. Three entries.

1. Joseph Featherston, Streetsville, Nancy B., Fancy B. and Jubilee.
2. A. Frank & Son, The Grange.

Highly Commended, Jos. Featherston, Streetsville, Nugget 2, Nugget 3 and Black Nancy.

Suffolks and Essex, Three Bacon Pigs. Two entries.

1. Jos Featherston, Streetsville. Nancy B., Fancy B. and Jubilee.
2. Jos. Featherston, Streetsville. Dark Beauty, Black Beauty and Jubilee 2nd.

Tamworth Barrow, nine months and under fifteen. Four entries

1. Thos. George, Mt. Elgin, Bob, 715
2. Thos. George, Mt. Elgin, Sam, 716.
3. Andrew Elliott, Galt, Hector, 697.

Highly Commended, Andrew Elliott, Galt, Ajax, 696.

Tamworth Barrow, six months and under nine. Four entries.

1. Thos George. Mt. Elgin. Billy, 718.
2. Andrew Elliott, Galt, Hercules, 698.
3. N. M. Blain, St. George, Brantford Boy, 710

Highly Commended, Thos George, Mt. Elgin, Jack, 717.

Tamworth Sow, nine months and under fifteen. Three entries.

1. Thos. George, Mt. Elgin, Rosa B., 787.
2. Thos. George, Mt. Elgin, Dora M., 786.
3. N. M. Blain, St. George, Della, 720.

Tamworth Sow, six months and under nine. Seven entries.

1. Andrew Elliott, Galt, Concord Dot, 768
2. Andrew Elliott, Galt, Concord Lady, 769.
3. N. M. Blain, St. George, Minnie F., 721.

Highly Commended, Thos. George, Mt. Elgin, Rosa Ann, 788.
Commended, Thos. George, Mt. Elgin, Kattie, 789.

Tamworth Sow or Barrow, under six months. Three entries.

1. Thos. George, Mt. Elgin, Kattie B., 791.
2. Thos. George, Mt. Elgin, Hannah B., 790.

Tamworths, Three Pigs, the offspring of one sow, bred by exhibitor. Two entries.

1. Thos. George, Mt. Elgin.
2. Andrew Elliott. Galt, Hector, 697; Hercules, 698, and Concord Dot, 768.

Tamworths, Three Bacon Pigs. Two entries.

1. Thos. George. Mt. Elgin.
2. Thos. George, Mt. Elgin.

Duroc Jersey Barrow, nine months and under fifteen. Three entries.

1. Tape Bros., Ridgetown, Bob, 230.
2. Tape Bros., Ridgetown, Joe, 229.
3. Wm. Butler & Son, Dereham Centre, Edgar, 288.

Duroc Jersey Barrow, six months and under nine. Three entries.

1. Wm. Butler & Son, Dereham Centre, Billy, 240.
2. Wm. Butler & Son, Dereham Centre, Kent, 239.
3. Tape Bros., Ridgetown, Tom, 231.

Duroc Jersey Sow, nine months and under fifteen. Three entries.

1. Tape Bros., Ridgetown, Canadian Princess, 238.
2. Tape Bros., Ridgetown, Dandy Princess, 239.
3. Wm. Butler & Son, Dereham Centre, Flora's Gem, 274.

Duroc Jersey Sow, six months and under nine. Three entries.

1. Wm. Butler & Son, Dereham Centre, Queen Anne 2nd, 276.
2. Tape Bros., Ridgetown, Howard's Best. 279.
3. Tape Bros., Ridgetown, Kent's Best, 280.

Duroc Jersey Sow or Barrow, under six months. Four entries.

1. Tape Bros., Ridgetown, Fanny, 265.
2. Tape Bros., Ridgetown, Billy. 232.
3. Wm. Butler & Son, Dereham Centre, Lucky 2nd, 241.

Highly Commended, Wm. Butler & Son, Dereham Centre, Queen's Own, 275.

Duroc Jerseys, Three Pigs, the offspring of one sow, bred by exhibitor. Two entries.

1. Tape Bros., Ridgetown.
2. Wm. Butler & Son, Dereham Centre.

Duroc Jerseys, Three Bacon Pigs. Three entries.

1. John Park & Son, Burgessville, Oxford Queen, 272, Daisy, 273, and Sir Walter, 257.
2. Tape Bros., Ridgetown.
3. Wm. Butler & Son, Dereham Centre.

Grades and Crosses, Barrow, nine months and under fifteen. One entry.

1. W. M. & J. C. Smith, Fairfield Plains.

Grades and Crosses, Barrow, under nine months. Nine entries.

1. J. G. Snell, Snelgrove, Prince.
2. N. M. Blain, St. George, Bob D.
3. Tape Bros., Ridgetown.

Highly Commended, H. Deddels, Kossuth.
Commended, J. G. Snell, Snelgrove, Flash.

Grades and Crosses, sow nine months and under fifteen. Three entries.

1. E. & N. Parks, Oriel
2. W. & H. Jones, Mt. Elgin.
3. W. & H. Jones, Mt. Elgin.

Grades and Crosses, sow under nine months. Six entries.

1. Tape Bros , Ridgetown.
2. J. G. Snell, Snelgrove, Jessie.
3. H. Deddels, Kossuth.

Highly Commended, J. G. Snell, Snelgrove, Flossie.

Sweepstake, for the best animal exhibited in the Swine Department. Twelve entries.

Prize, a No. 1 Leader Corn and Root Cultivator, value $10, donated by Thom's Implement Works, Watford.

1. J. G. Snell, Snelgrove, Snell's Charmer. 5236.

BACON PIGS.

$25 was donated towards the prize list for Bacon Pigs by the Wm. Davies Company, Limited, Toronto, Pork Packers and Export Provision Merchants.

Special by the Ingersoll Packing Company, Ingersoll, Ont., Cheese Exporters and Pork Packers, for six best Lean Singers. Three entries.

1. O. J. Benedict, Mt. Vernon.
2. Thos. A. Good, Brantford.

Special by F. W. Fearman, Hamilton, Pork Packer and Provision Merchant, for five hogs that will meet the requirements of the Packing Industry as ideal Singers suitable for export trade. Four entries.

1. J. E. Brethour, Burford.
2. Wm. Butler & Son, Dereham Centre.

THE DAIRY.

$50 each was donated towards the prize list in the Dairy Department by the Cheese and Butter Associations of Eastern and Western Ontario.

Shorthorn Cow, thirty-six months and over. One entry.

1. F. Martindale, York, Waterloo Daisy, 19853.

Shorthorn Cow, under thirty-six months. No entries.

Prizes in this class were duplicated by Dominion Shorthorn Breeders' Association.

Ayrshire Cow, thirty-six months and over. Four entries.

1. J. R. Alexander, Brantford, Emma A., 344.
2. M. W. & J. C. Smith, Fairfield Plains, Pauline Hall, 2241.
3. N. Dyment, Clappison's Corners, Nellie Gray, 2057.

Highly Commended, R. S. Brooks, Brantford, Daisy Bell, 2490.

Ayrshire Cow, under thirty-six months. Three entries.

1. N. Dyment, Clappison's Corners, Ruby of Hickory Hill, 3366.
2. W. M. & J. C. Smith, Fairfield Plains, Gerta's Queen, 2750.
3. R S. Brooks, Brantford, Belle of Rosamond, 2837.

$25 additional was donated by the Ayrshire Breeders' Association for the Ayrshire Cow which made the best record.

1. W. M. & J. C. Smith, Fairfield Plains.

Holstein Cow, thirty-six months and over. Four entries.

1. A. & G. Rice, Curries, Calamity Jane, (C. H. H. B.) 1156.
2. Jas. Rettie, Norwich, Fanny F., (C. H. H. B.) 928.
3. Jas. Rettie, Norwich, Aaltje Posch 4th, (C. H. H. B.) 65.

Highly Commended, A. & G. Rice, Curries, Edgely Frena, (C. H. H. B.) 1074.

Holstein Cow, under thirty-six months. Four entries.

1. G. W. Clemons, St. George, Queen De Kol 2nd, 1819.
2. G. W. Clemons, St. George, Daisy De Kol. 1502.
3. A. & G. Rice, Curries, Daisy Texal 2nd, (C. H. H. B. 1637).

Highly Commended, A. & G. Rice, Curries, Blossom's Baroness, (C. H. H. B. 1433).

Jersey Cow, thirty-six months and over. Four entries.

1. J. H. Smith & Son, Highfield, Fancy of Oakdale, 83533.
2. J. H. Smith & Son, Highfield, St. Lambert's Katheline, 27810.
3. J H. Smith & Son, Highfield, Saphire, 13488

Highly Commended, T. H. Dent, Woodstock, Nina of Openshaw, 94815.

Jersey Cow, under thirty-six months. One entry.

1. T. H. Dent. Woodstock, Donaiain, 125142.

Guernsey Cow, thirty-six months and over. Two entries.

1. Wm. Butler & Son, Dereham Centre, My Fancy of Sedgfield, 8431.
2. Wm. Butler & Son, Dereham Centre, Queen of Sunny Springs, 7752.

Guernsey Cow, under thirty-six months. One entry.

1. Wm. Butler & Son, Dereham Centre, Phyllis Lassie, 8453.

Grade Cow, thirty-six months and over. Eight entries.

1. W. Temple Thompson, Rockton, Beauty of Rockton.
2. T. H. Dent, Woodstock, Dina.
3. F. Martindale, York, Lady Cleveland.

Highly Commended, T. H. Dent, Woodstock, Daisy.
Commended, J. R. Alexander, Brantford.

Grade Cow, under thirty-six months. Three entries.

1. H. McDougall, Guelph, Sweet Assurance.
2. James Rettie, Norwich, Johanna.

SWEEPSTAKES AND SPECIALS.

Sweepstakes, for cow under thirty-six months. Prince of Wales' prize, $30. Six entries.

1. G. W. Clemons, St. George, Queen De Kol 2nd, 1819.

Sweepstakes, for cow thirty-six months and over. Prince of Wales' prize, $18. Five entries.

1. A. & G. Rice, Curries, Calamity Jane, (C. H. H. B.) 1156.

The following prizes were offered as specials in this class by the Canadian Holstein Friesian Association: For the best pure bred Dairy Cow, $25; for the two next best Holstein Friesian Dairy Cows registered in the C. H. F. H. B., $15 and $10 respectively.

1. A. & G. Rice, Curries, Calamity Jane, (C. H. H. B.) 1156.
2. Jas. Rettie, Norwich, Fancy F., (C. H. H. B.) 928.
3. Jas. Rettie, Norwich, Aaltje Posch 4th, (C. H. H. B.) 65.

The Holstein Friesian Association of America offered as specials in this class: $25 for the 1st and $15 for the 2nd, to be paid to any Holstein Friesian cows winning premiums in competition with cattle of other breeds, providing such animals are recorded in the herd book of the Association. *Two entries.*

1. A. & G. Rice, Curries, Calamity Jane, (A. H. H. B.) 26292.
2. A. & G. Rice, Edgley Frena, (A. H. H. B.) 41398.

APPENDIX III.

LIST OF MEMBERS FOR 1897-8.

THE DOMINION CATTLE BREEDERS' ASSOCIATION.

Name.	Address.	Class.
Anderson, J. A. R	Hamilton, Ont	Ayrshires.
Alexander, J. R	Brantford, Ont	Ayrshires.
Arnold, H. G. & Son	Maidstone, Ont	
Attrill, Mrs. H. F	Saltford, Ont	Holsteins.
Ballantyne, Hon. Thos. & Son	Stratford, Ont	Ayrshires.
Barclay, Luther	Port Hope, Ont	Shorthorns.
Biggins, W. J	Clinton, Ont	Shorthorns
Birrell, David	Greenwood, Ont	Shorthorns.
Bowman, Jas	Guelph, Ont	Polled Angus.
Bolton, A. & F	Armstrong's Mills, Ont	Shorthorns.
Brown, A. & D	Iona, Ont	Shorthorns.
Bonnycastle, F	Campbellford, Ont	Shorthorns.
Bright, Jno	Myrtle	Shorthorns.
Brooks, Chas	Brantford, Ont	Ayrshires.
Brooks, R. S	Brantford, Ont	Ayrshires.
Bull, B. H. & Son	Brampton, Ont	Jerseys.
Butler, Wm. & Son	Dereham Centre, Ont	Guernseys.
Burnett, Leonard G	Greenbank, Ont	Shorthorns.
Burt, D. W	Coningsby, Ont	Polled Angus.
Caldwell Bros	Orchard, Ont	Ayrshires.
Clark, J. G	Ottawa, Ont	Ayrshires.
Campbell, John	Woodville, Ont	Shorthorns.
Clemons, G. W	St. George, Ont	Holstein-Friesian.
Corby, H	Belleville, Ont	
Cooper, J. V	Picton, Ont	Shorthorns.
Davidson, J. I. & Son	Balsam, Ont	Shorthorns.
Davies, Robert	Toronto, Ont	Ayrshires.
Davis, J. F	Tempo, Ont	Shorthorns
Dredge, Wm. & Son	Nassagaweya, Ont	Shorthorns.
Dent, T. H	Woodstock, Ont	Jerseys.
Douglas, Jas	Caledonia, Ont	Shorthorns.
Dyment, Naaman	Clappison's Corners, Ont	Ayrshires.
Dundas, R. D	Springville, Ont	Ayrshires
Edwards, W. C. & Co	North Nation Mills, Que	Ayrshires, Shorthorn and Jerseys.
Else, L. & F	Boxall, Ont	Jerseys.
Elliott, W. R	Hespeler, Ont	Shorthorns.
Edmondson, Alex	Brantford, Ont	
Fairbairn, H. K	Thedford, Ont	Shorthorns.
Fleming, J. S	Gill, Ont	
Fried, J. & Sons	Roseville, Ont	Shorthorns
Gardhouse, J. M	Highfield, Ont	Shorthorns.
Grainger, Wm. & Son	Londesboro', Ont	Shorthorns.
Garnham, E. A	Straffordville, Ont	Shorthorn.
Gibson, R	Delaware, Ont	Shorthorns, Jerseys.
Gibson, J. T	Denfield, Ont	Shorthorns.
Gies, C. R	Heidelberg, Ont	Holsteins
Gorwill, S. B	Fanshawe, Ont	Shorthorns.
Guy, Thos., Estate of	Oshawa, Ont	Ayrshires.
Guy, Frank	Bowmanville, Ont	Ayrshires.
Hamilton, Wm	Guelph, Ont	
Hallman, A. C	New Dundee, Ont	Holstein-Friesian.
Harper, Samuel	Cobourg, Ont	Devons.
Hall, Walter	Washington, Ont	Polled Angus.
Hobson, John I	Guelph, Ont	
Hoover, A., jr	Emery, Ont	Holsteins.
Hume, Alex	Burnbrae, Ont	Ayrshires.
Jamieson, R	Perth	Ayrshire, Jerseys.
Jameson, Wm. S	Dutton, Ont	Polled Angus.
Jeffs, E. & Son	Bond Head, Ont	Shorthorns.

MEMBERS OF CATTLE BREEDERS' ASSOCIATION.—*Concluded.*

Name.	Address.	Class.
Johnston, A	Greenwood, Ont	Shorthorns.
Kaufman, A. E	Washington, Ont	Polled Angus.
Leask, Jas	Greenbank, Ont	Shorthorns.
Linton, Wm	Aurora, Ont	Shorthorns.
Martyn, J. W	Canton, Ont	Shorthorns.
Martindale, F	York, Ont	Shorthorns.
Marshall, Peter	Ayr, Ont	Herefords.
Milloy, D	Paris, Ont	Shorthorns.
Miller, R	Brougham, Ont	Shorthorns.
Miller, John	Markham, Ont	Shorthorns.
Murrison, Jas	West Lorne, Ont	Polled Angus.
McCrae, David	Guelph, Ont	Galloways.
McCallum, John R	Iona Station, Ont	Shorthorns.
McFarlane, Jas	Clinton, Ont	Polled Angus.
McGregor, J. D	Brandon, Man	Polled Angus.
McNish, C. H	Lyn, Ont	Guernseys.
McIntyre, D. N	Paisley, Ont	Shorthorns.
McCormack, Jas. & Son	Rockton, Ont	Ayrshires.
McDougall, H	Guelph, Ont	Polled Angus.
Nichols, W. H	Hamilton	Butcher.
Nichol, Walter	Plattsville, Ont	Ayrshires.
Oke, Jas. & Son	Alvinston, Ont	Shorthorns.
O'Brien, John	London West, Ont	Jerseys.
Oliver, Wm	Avonbank, Ont	
Peterson, C. W	Regina, Assa	Ayrshires, Highland cattle.
Pettit, W. G	Freeman, Ont	Shorthorns.
Rawlings, Albin	Forest, Ont	Herefords.
Randall, Thos	Brantford, Ont	
Reid, R. & Co	Hintonburg, Ont	Ayrshires.
Rennie, Jas	Wick, Ont	Shorthorns.
Rennie, Malcolm	New Hamburg, Ont	Shorthorns.
Rice, A. & G	Curries, Ont	Holstein-Friesian.
Robertson, Thos	Dunsford, Ont	Polled Angus.
Robson, Walter	Washington, Ont	
Rudd, W. J	Eden Mills, Ont	Devons.
Rusnell, D. H	Stouffville, Ont	Shorthorns.
Rutherford, John & Son	Roseville, Ont	Herefords.
Shaw, A. J. C	Thamesville, Ont	Shorthorns.
Sharp, Jas	Rockside, Ont	Polled Angus.
Shaw, A. M. & Robt	Brantford, Ont	Galloways.
Snell, J. C	Snelgrove, Ont	Jerseys.
Stewart, Wm., jr	Menie, Ont	Ayrshires.
Stewart, Wm. & Son	Lucasville, Ont	Polled Angus.
Steacy, R. G	Brockville, Ont	Ayrshires.
Smith, Amos	Trowbridge, Ont	Shorthorns.
Sibbald, F. C	Sutton, Ont	Shorthorns.
Smith, W. M. & J. C	Fairfield Plains, Ont	Ayrshires.
Smith, Jas. S	Maple Lodge, Ont	Shorthorns.
Smith, J. H. & Son	Highfield, Ont	Jerseys.
Smith, H. & W	Hay, Ont	Shorthorns.
Silcox, Edgar	Shedden, Ont	Jerseys.
Sibbald, John	Annan, Ont	Galloways.
Smith, H. D	Compton, Que	Herefords.
Simmons, C. M	Ivan, Ont	Shorthorns.
Sorby, D. & O	Guelph, Ont	Ayrshires.
Scott, F. W	Highgate, Ont	Shorthorns.
Stone, Alf	Guelph, Ont	Herefords.
Stone, F. W., Estate	Guelph, Ont	Herefords.
Stutt, Richard	Forest	Herefords.
Tolton, Jas	Walkerton, Ont	Shorthorns.
Thompson, Wm. Temple	Rockton, Ont	Ayrshires.
Varcoe, Major John	Carlow, Ont	Polled Angus.
Wade, Henry	Toronto, Ont	Registrar of Live Stock.
Wells, Martin	Canning, Ont	
White, R. E	Perth, Ont	Shorthorns, Ayrshires.
Wood, W. J	Cornwall, Ont	Jerseys.
Yuill, J. & Sons	Carleton Place, Ont	Ayrshires.

THE DOMINION SHEEP BREEDERS' ASSOCIATION.

Name.	Address.	Class.
Allen, Geo	Oriel, Ont	Cotswolds.
Arkell, Peter	Teeswater, Ont	Oxfords.
Arkell, Henry	Teeswater, Ont	Oxfords.
Armour, Andrew	Dunnville, Ont	Leicesters.
Armstrong, G. B	Teeswater, Ont	Leicesters.
Arkell, Henry	Arkell, Ont	Oxfords.
Austin, W. R	Sapperton, B. C	
Blais, A. J	Glen Sandfield, Ont	Leicesters.
Baker, Geo. & Son	Simcoe, Ont	Southdowns.
Blackwood, Robt	Martintown, Ont	Shropshires.
Beattie, W. H	Wilton Grove, Ont	Shropshires.
Benning, David	Williamstown, Ont	Leicesters.
Birdsall, F. & Son	Birdsall, Ont	Oxfords.
Bright, Jno	Myrtle	Shropshires.
Brown, Alfred	Picton, Ont	Shropshires.
Bowman, James	Guelph, Ont	Dorsets.
Bonnycastle & Sons	Campbellford, Ont	Cotswolds.
Brown, John L	Uxbridge, Ont	Cotswolds.
Calder, Chas	Brooklin, Ont	Shropshires.
Campbell, John	Woodville, Ont	Shropshires.
Campbell, Jas. K	Palmerston, Ont	Leicesters.
Charters, Robt	Egmondville, Ont	Leicesters.
Conworth, John	Paris, Ont	Shropshires.
Cousin, J. & Son	Harriston, Ont	Oxfords.
Cornish, Jno. W	Orchard, Ont	Dorset Horns.
Cornish, Jno., Sr	Orchard, Ont	Dorset Horns.
Cooper, J. V	Picton, Ont	Oxfords.
Currelley, T. & Son	Fullerton, Ont	Leicesters.
Davies, Robt	Toronto, Ont	Shropshires.
Dickenson, Wm	Mildmay, Ont	Oxfords.
Dickin, John	Milton West, Ont	Shropshires.
Donaldson, W	South Zorra, Ont	Shropshires.
Douglas, T. C	Galt, Ont	Southdowns.
Evans, Smith	Gourock, Ont	Oxfords
Elliott, Andrew	Galt, Ont	Shropshires.
Elliott, Andrew	Pond Mills, Ont	Oxfords.
Elliott, W. R	Hespeler, Ont	Oxfords.
Ewing, J. B	Dartford, Ont	Shropshires.
Everett, G. P	Mt. Vernon, Ont	Shropshires.
Frink, B. H	Napanee, Ont	Cotswolds.
Ficht, Val	Oriel, Ont	Cotswolds.
Finlayson, Kenneth	Campbellton, Ont	Oxfords.
Garnham, E. A	Straffordville, Ont	Leicesters.
Gardhouse, J. & Son	Highfield, Ont	Leicesters.
Ganton, D. G	Saurin, Ont	Shropshires.
Gaunt, E. & Sons	St. Helen's, Ont	
Gibson, Richard	Delaware, Ont	Shropshires.
Gibson, J. T	Denfield, Ont	Lincolns.
Gibson & Walker	Ilderton, Ont	Lincolns.
Gibbs, Jno	Woodville, Ont	Cotswolds.
Gould, Geo. & Son	Rutherford, Ont	Lincolns.
Gurney, C. W	Paris, Ont	
Hawkshaw, W. S	Glanworth, Ont	Shropshires.
Harding, R. H	Thorndale, Ont	Horned Dorset.
Hanmer, D. G. & Son	Burford, Ont	Shropshires.
Hanmer Bros	Mt. Vernon, Ont	Shropshires.
Hart, Alex	Hampstead, Ont	
Hine, R. J	Dutton, Ont	Oxfords.
Hill, Thos	Ridgeville, Ont	Horned Dorsets.
Hobson, Jno. I	Guelph, Ont	Shorthorns.
Honey, R	Brickley, Ont	Cotswolds.
Humphrey, E. & Co	Thamesford, Ont	Lincolns.

MEMBERS OF THE SHEEP BREEDERS' ASSOCIATION.—*Concluded.*

Name.	Address.	Class.
Hunter, Jno	Wyoming, Ont	Horned Dorsets.
Jackson, John	Abingdon, Ont	Southdowns.
Jull, J. H	Mt. Vernon, Ont	Oxfords.
Johnston, James	Trafalgar, Ont	Dorset Horns.
Kelly, John	Shakespeare, Ont	Hampshires, Leicesters.
Lea, H. F	Consecon, Ont	Horned Dorsets.
Lemmon, S	Kettleby, Ont	Southdowns.
Linton, Wm	Aurora, Ont	Cotswolds.
Little, Robt. E	Teeswater, Ont	Leicesters
Martin, Wm	Binbrook, Ont	Southdowns.
Martin, R. G	Marysville, Ont	Leicesters.
Millar, R.	Brougham, Ont	Shropshires.
Miller, John	Markham, Ont	Southdowns.
Moore, J. D	Galt, Ont	
McCrae, David	Guelph, Ont	Southdowns, Cotswolds.
McFarlane, Jas.	Clinton, Ont	Shropshires.
McKellar, Jno	Avonton, Ont	Dorsets.
McGillivray, J. A	Uxbridge, Ont	Dorsets.
Oliver, Wm	Avonbank, Ont	Lincolns
Orr & Lillico	Galt, Ont	Leicesters.
Parkinson, L	Eramosa, Ont	Leicesters.
Parkinson, E	Eramosa, Ont	Lincolns.
Parks, John	Burgessville, Ont	Cotswolds.
Phinn, J. P	Hespeler, Ont	Shropshires.
Parks, E. & N	Oriel, Ont	Cotswolds.
Pollard, A	Burford, Ont	
Pettit, W. G	Freeman, Ont	Shropshires.
Rae, Wm	Arkell, Ont	
Rennie, Wm. A	Shakespeare, Ont	Leicesters.
Robson, Thos. E	Ilderton, Ont	Lincolns.
Russell, Jas. & W	Richmond Hill, Ont	Cotswolds.
Rutherford, Jno	Roseville, Ont	Southdowns.
Rutherford, I. C	Kemptville, Ont	Horned Dorsets.
Rudd, W. J	Eden Mills, Ont	Suffolks.
Slater, J	Buttonville, Ont	Cotswolds.
Stevens, R. W	Lambeth, Ont	Lincolns.
Snell, Jas	Clinton, Ont	Leicesters.
Snell, J. C	Snelgrove, Ont	Cotswolds.
Simenton, A. & Son	Blackheath, Ont	Southdowns.
Smith, W. M. & J. C	Fairfield Plains, Ont	Merinos.
Smith, J. S	Maple Lodge, Ont	Leicesters.
Shore, Hardy	Glanworth, Ont	Cotswolds.
Sorby, D. & O	Gourock, Ont	Shropshires.
Stonehouse, Wm	Wyoming, Ont	Horned Dorsets.
Shopland, J. S	Maywood, B. C	Southdowns.
Telfer, A. & Son	Paris, Ont	Southdowns.
Terrill, A	Wooler, Ont	Oxfords.
Tolton, Jas	Walkerton, Ont	Oxfords.
Thompson, Wm	Uxbridge, Ont	Cotswolds.
Thompson, John	Uxbridge, Ont	Cotswolds.
Thompson, Jas	Mildmay, Ont	Suffolks.
Turner, Elmer	Burford, Ont	Oxfords.
Vance, Ed	Emerson, Man	Dorsets.
Vance, Robt	Ida, Ont	Cotswolds.
Walker, G	Ilderton, Ont	Lincolns.
Watt, W. B	Salem, Ont	Leicesters.
Wren, Christopher	Uxbridge, Ont	Shropshires.
West, Wm	Ilderton, Ont	Lincolns.
Wightman, R	Owen Sound, Ont	
Wright, W. E	Glanworth, Ont	Shropshires.
Wright, H	Guelph, Ont	Oxfords.
Whitelaw Bros	Guelph, Ont	Leicesters.
Wilkie, Geo. N	Wisbeach, Ont	
Wood, C. & E	Freeman, Ont	Leicesters.
Yuill, Jos. & Son	Carleton Place, Ont	Shropshires.

Name.	Address.	Class.
Ash, Wm. R	Essex, Ont	Berkshires.
Anderson, J. D	Wyoming, Ont	Berkshires.
Anderson, Jno. A	Morgantown, Ont	Berkshires.
Arkell, Henry	Arkell, Ont	Berkshires.
Atkinson, Wm	Wardsville, Ont	Duroc Jerseys.
Austin, W. R	Sapperton, B. C	Chester Whites.
Baldwin, Wm	Manitou, Man	Berkshires.
Bell, John	Amber, Ont	Tamworths.
Bennett, Geo. and Pardo	Charing Cross, Ont	Chester Whites.
Beingessner, F. X	Mildmay, Ont	Chester Whites.
Bennett, Jos	South Buxton, Ont	Poland Chinas.
Bennett, H. & Son	St. Williams, Ont	Berkshires.
Berdan & McNeil	Strathburn, Ont	Duroc Jerseys.
Blair, Wm	Ochre River, Man	Berkshires.
Bradley, L. A	Portage La Prairie, Man	Tamworths.
Bray, Jas	Longburn, Man	Yorkshires.
Blain, N. M	St. George, Ont	Tamworths.
Brandow, A. W	Walsingham Centre, Ont	Tamworths.
Bate, E. H	Brighton, Ont	Tamworths, Poland Chinas.
Baker, Ed	Amherst, N. S	Duroc Jerseys.
Bailey, H. C	Cookshire, Que	Berkshires.
Brethour, J. E	Burford, Ont	Yorkshires.
Brien, E	Ridgetown, Ont	Berkshires.
Birdsall F. & Son	Birdsall, Ont	Chester Whites
Benedict, O. J	Mt. Vernon, Ont	Tamworths.
Bonnycastle, F. & Son	Campbellford, Ont	Berkshires.
Boynton, P. W. & Son	Dollar, Ont	Berkshires.
Brown Bros	Springville, Ont	Berkshires.
Bowles, Levi	Springfield, Ont	Berkshires.
Brownridge, J. T	Ashgrove, Ont	Tamworths.
Bow Park Co., Ltd	Brantford, Ont	Berkshires.
Brown, F. W	Portage La Prairie, Man	Berkshires.
Brownlee, Jos	Shawville, Que	Poland Chinas.
Bowman, W. R	Mount Forest, Ont	Berkshires.
Boucher, Geo	Meadowvale, Ont	Berkshires.
Brooks, Thos. & Son	Brantford, Ont	Chester Whites.
Bowman, W. A	Elmdale, N. Y	Yorkshires
Brodie, G. A	Bethesda, Ont	Berkshires.
Brown, Wm	Paisley, Ont	Tamworths.
Boyes, Jno., jr	Churchill, Ont	Berkshires.
Butler, Wm. & Son	Dereham Centre, Ont	Chester Whites, Victorias.
Burgess, R. L., Mrs	Burgessville, Ont	Berkshires.
Bruce Bros	Gormley, Ont	Berkshires.
Bull, B. H. & Son	Brampton, Ont	Berkshires.
Cairns, Jos	Camlachie, Ont	Chester Whites.
Cairn, Jos	Camlachie, Ont	Chester Whites.
Caldwell, Bros	Orchard, Ont	Berkshires.
Callbeck, J. W	Augustine Grove, P. E. I	Yorkshires, Poland Chinas.
Campbell, D	Duntroon, Ont	Berkshires.
Campbell, D	Norwood, Ont	Berkshires.
Campbell, Mac	Northwood, Ont.	Berkshires, Chester Whites.
Capes, Henry	Kertch, Ont	Poland Chinas.
Carruthers, C. J	Cobourg, Ont	Berkshires.
Carter, Eliphet	Bayham, Ont	Tamworths.
Cavanagh, Wesley	Frankville, Ont	Berkshires, Tamworths.
Caverley, E	Sine, Ont	Berkshires
Clark, H. G	Brampton, Ont	Berkshires.
Clark, Jno	Orangeville, Ont	Yorkshires.
Clark, J. B	Blenheim, Ont	Chester Whites, Berkshires.
Chalk, J. H	Calton, Ont	Chester Whites.
Clark, J. G	Ottawa, Ont	Yorkshires.
Clarke, Wm	North Wiltshire, P. E. I.	Yorkshires.
Clarke, Wm	West Lorne, Ont	Poland Chinas.
Clifford, Frank	Wellington, Ont.	Yorkshires.
Creighton, J. C	Hawley, Ont	Tamworths.

MEMBERS OF THE SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Christie, Jas	Winchester, Ont	Chester Whites.
Coxworth, S	Whitby, Ont	Berkshires.
Cox, T. A	Brantford, Ont	Berkshires.
Cousins, Jno. & Son	Harriston, Ont	Yorkshires.
Conroy, R. & W	Deschenes Mills, Que	Tamworths.
Collyer, F. J	Welwyn, Assa	Berkshires.
Colwill Bros	Newcastle, Ont	
Crockett, Geo	York, P. E. I	Yorkshires.
Cook, Jas	Maple Hill, Ont	Yorkshires.
Cowieson, J. B	Queensville, Ont	Chester Whites.
Cook, F	Parkhill, Ont	Berkshires.
Connolly, P. I	Middleton, P. E. I	Berkshires.
Chute, H. J	Somerset, N. S	Chester Whites.
Curtis, A. E	Stanstead, Que	Chester Whites.
Curtis, C. H	Warkworth, Ont	Poland Chinas.
Cullen, Jas. E	Lakefield, Ont	Berkshires.
Curts, Henry	Arkona, Ont	Poland Chinas.
Culp, A. S	Jordan, Ont	Chester Whites.
Davis, H. J	Woodstock, Ont	Berkshires, Tamworths.
Drake, S. F	Pownall, P. E. I	Chester Whites.
Day, N	Powle's Corners, Ont	Yorkshires.
Dawson, Fred	Collingwood, Ont	Tamworths.
Davis, C. G	Freeman, Ont	Yorkshires.
Davis, J. F	Tempo, Ont	Yorkshires.
Darling, L. A	Morganston, Ont	Yorkshires.
De Courcey, D	Bornholm, Ont	Poland Chinas.
Decker, C. R	Chesterfield, Ont	Berkshires.
Demaray & Son	Strathroy, Ont	Yorkshires.
Deddles, Henry	Kossuth, Ont	Yorkshires.
Dyment, S	Barrie, Ont	Berkshires.
Denison, J. R	Denison's Mills, Que	Chester Whites.
DePuy, F	Rochester, N. Y	Yorkshires.
Denison, W. S	Denison's Mills, Que	Chester Whites.
Dickson, W. L	Dromore, Ont	
Dickenson, Wm	Mildmay, Ont	Berkshires.
Dool, E	Hartington, Ont	Berkshires.
Dorrance, Jas	Seaforth, Ont	Berkshires.
Donaldson, Jas	Dewittville, Que	Tamworths.
Dunn, And	Ingersoll, Ont	Tamworths.
Drury, Oliver	Fargo, Ont	Poland Chinas.
Duch, Wm. J	Morpeth, Ont	Berkshires, Poland Chinas.
Dunbar, Jno	St. Marys, Ont	Berkshires.
Duthie, Jas	Melgund, Man	Berkshires.
Edwards, W. C	Rockland, Ont	Berkshires.
Edwards, Edwin	North Wiltshire, P. E. I	Yorkshires,
Elliott, A	Pond Mills, Ont	Poland Chinas, Duroc Jerseys
Elliott, And	Galt, Ont	Tamworths.
Elder, Jas	Virden, Man	Berkshires.
Elliott, W. T	Hamilton, Ont	Tamworths.
Empsy, M. N	Napanee, Ont	Yorkshires.
Empsey, Jno	Brandon, Man	Berkshires.
Ensley, T. L	Charleston, Ill	Tamworths.
Evoy, H. W. & Son	Bar River, Ont	Berkshires.
Ewing, J. B	Dartford, Ont	Berkshires.
Everret, W. W	Chatham, Ont	Chester Whites.
Frank, A. & Son	The Grange, Ont	Suffolks.
Fraser, D & Son	Emerson, Man	Poland Chinas.
Fraser, I. O. & Son	Fellows, Ont	Duroc Jerseys.
Fahner, Chris	Crediton, Ont	Duroc Jerseys.
Featherston, Jos	Streetsville, Ont	Suffolks, Yorkshires, Essex.
Ferguson, J. J	Smith's Falls, Ont	Berkshires.
Ferland, Jos. B	Three Rivers, Que	Yorkshires.
Fisher, W. W	Benmiller, Ont	Poland Chinas.
Flatt, D. C	Millgrove, Ont	Tamworths.
Fulton, John, jr	Brownsville, Ont	Tamworths.
Graham, D. A	Parkhill, Ont	Berkshires.
Gaffield, N. S	Castleton, Ont	Berkshires.
Gardner, F. A	Brittania, Ont	Berkshires.

MEMBERS OF THE SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Graham, And	Pomeroy, Man	Yorkshires.
Garbutt, T. C	Claremont, Ont	Berkshires.
Green, Geo	Fairview, Ont	Berkshires.
Greenwood, Thos	Douglas, Man	Berkshires
George, Thos	Mt. Elgin, Ont	Tamworths.
George, H. & Sons	Crampton, Ont	Chester Whites, Tamworths.
George, E. D	Putnam, Ont	Chester Whites.
Greenshields, J. N	Danville, Que	Yorkshires
Greenway, Thos., Hon	Winnipeg, Man	Berkshires.
Gier, Geo	Grand Valley, Ont	Berkshires.
Gibson, R	Delaware, Ont	Berkshires.
Gibson, W. T	Marshfield, P. E. I	Berkshires.
Gibson, Robt	Galt, Ont	Berkshires.
Gilroy, C. J. & Son	Glen Buell, Ont	Yorkshires.
Gies, Anthony	St. Jacobs, Ont	Berkshires, Yorkshires
Gibson, D. J	Bowmanville, Ont	Tamworths.
Golding, Henry	Thamesford, Ont	Tamworths.
Golden, J. H	Amherstburg, Ont	Berkshires.
Glover, H. W	Nottawa, Ont	Chester Whites.
Gosney, Thos	Miami, Man	Berkshires.
Good, Thomas	Brantford, Ont	Berkshires, Tamworths.
Godard, Chas. E	Cobourg, Ont	Chester Whites, Yorkshires.
Gummer, Geo. A	Colborne, Ont	Chester Whites.
Hamilton, David, V. S	Harriston, Ont	Berkshires.
Harding, R. H	Thorndale, Ont	Chester Whites.
Hawkins, D	Woodville, Ont	Berkshires.
Haycroft, W. J	Agincourt, Ont	Berkshires.
Hanley, J. C	Read, Ont	Berkshires.
Hallman, A. C	New Dundee, Ont	Tamworths.
Hauser Ignatius	Weissenburg, Ont	Berkshires.
Hartman, J. W	Elmhedge, Ont	Berkshires.
Hart, Alex	Hampstead, Ont	Berkshires.
Hall, And., jr	Ayr, Ont	Berkshires.
Harris, Geo. N	Lynden, Ont	Berkshires.
Harvey, A. P	Kincardine, Ont	Yorkshires.
Henderson, W. C	Keady, Ont	Berkshires.
Herron, Henry	Avon, Ont	Poland Chinas, Chester Whites.
Hyde, Geo. A	Shakespeare, Ont	Yorkshires.
Henderson, W	Thamesville, Ont	Berkshires.
Hill, Geo	Delaware, Ont	Berkshires.
Hoffarth, Jos	Carlsruhe	Tamworths.
Hood, G. B	Guelph, Ont	Yorkshires.
Holland, Isaac	Culloden, Ont	Tamworths.
Honey, R	Brickley, Ont	Yorkshires
Holmes, C. W	Amherst, N. S	Poland Chinas, Chester Whites.
Hoover, P. R. & Sons	Green River, Ont	Tamworths.
Howe, Wm	North Bruce, Ont	Berkshires, Yorkshires.
Howden, Jno	Edgeley, Assa	Berkshires.
Hoard, John & Sons	Parkhill, Ont	Poland Chinas, Yorkshires, Suffolks, Tamworths.
Holdsworth, R. L., & Sons	Port Hope, Ont	Berkshires.
Holland, T. F	Dereham Centre, Ont	Chester Whites.
Howard, N. H	Lynden, Ont	Duroc Jerseys.
Hurley, J. M. & Son	Belleville, Ont	Yorkshires.
Hume, Alex. & Co	Burnbrae, Ont	Yorkshires.
Hunter, H. A	Orangeville, Ont	Yorkshires.
Hurlburt, B. J	Clymer, N.Y	Yorkshires.
Hyde, G. A	Shakespeare, Ont	Berkshires, Yorkshires.
Innes, Jas. & Son	Currie's Crossing, Ont	Chester Whites.
Irwin, J. I	Stewart, Ont	Poland Chinas.
Jeffs, E. & Son	Bond Head, Ont	Berkshires.
Johnston, A	Greenwood, Ont	Berkshires.
Jones, Wm	Zenda, Ont	Poland Chinas.
Johnston, Jno	Little Rideau, Ont	Yorkshires.
Jones, W. & H	Mt. Elgin, Ont	Poland Chinas.
Johnston, Jno	Underwood, Ont	Berkshires.
Johnston, F. P	Moscow, Ont	Berkshires, Tamworths.
Keana, Wm	Stratford, Ont	Berkshires.

MEMBERS OF THE SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Kneal, J. A. & F	Holbrook, Ont	Poland Chinas.
Keough, J. E	Rockwood, Ont	Yorkshires.
Ker, J. G	Fulton, Ont	Berkshires.
Ker, J. G	Woodburn, Ont	Berkshires.
Kenny, J. W	Heathcote, Ont	Yorkshires.
Kitching, John	Corwhin, Ont	Berkshires.
Kipp, E. A	Chilliwack, B C	Berkshires.
King, Wm	Carnduff, Assa	Berkshires.
Kitson, Wm	Burnside, Man	Berkshires.
King, Wm. Penn	Oakwood, Ont	Berkshires, Yorkshires.
Lang, R. L	Oak Lake, Man	Berkshires.
Lawrie, R. J. & Bros	Wolverton, Ont	Tamworths.
Lane, Henry	Mt. Mellick, P. E. I	Berkshires.
Lane, Jno. & Son	Kinlough, Ont	Berkshires.
Laidler, Jos	Neepawa, Man	Berkshires.
Latimer Bros	Arkport, N. Y	Yorkshires.
Lahmer, Jno	Carrville, Ont	Berkshires.
Lemon, S	Kettleby, Ont	Berkshires.
Leatherdale, E	Morden, Man	Berkshires.
Lee, Jos., & Sons	Dunham, Que	Duroc Jerseys.
Livingston, J. A	Grattan, Ont	Tamworths.
Linton, Wm	Aurora, Ont	Berkshires.
Little, Thos. jr	Kirkwall, Ont	Yorkshires.
Lloyd, E. A	Stouffville, Ont	Berkshires.
Lloyd, And	Edgley, Ont	Berkshires.
Martin, E. E	Canning, Ont	Berkshires.
Martin, R. G	Marysville, Ont	Berkshires.
Mark, Geo. H	Oakwood, Ont	Berkshires.
Master, Levi	Haysville, Ont	Tamworths.
Mayloney, F. A	Chapeau, Que	Yorkshires.
Master, J. F	New Dundee, Ont	Yorkshires.
May, W. A	Creemore, Ont	Yorkshires, Tamworths.
Martin, S. Edgar	Bloomfield, Ont	Duroc Jerseys.
Major, W	Whitevale, Ont	Tamworths.
Mallory, A. E	Colborne, Ont	Berkshires.
Meyer, Jno	Kossuth, Ont	Berkshires.
Meredith & Dunlop	Thorncliffe, Ont	Poland Chinas.
Moody, R	Guelph, Ont	Berkshires.
Morrison, Alex	Carman, Man	Berkshires.
Morse, Jno	Amherst, N. S	Chester Whites.
Morrow, R. O	Hilton, Ont	Tamworths.
Morgan, E. H	Stanbridge Station, Que	Berkshires.
Moody, Ed	Humber, Ont	Tamworths.
Mullen, Jas. A	Cypress River, Man	Berkshires.
Mutch, J. F	Pilot Mound, Man	Berkshires.
Murray, G. H	Innerkip, Ont	Berkshires.
Murphy, R. G	Elgin, Ont	Berkshires.
McAllister, Wm	Varna, Ont	Berkshires.
McKay, J. F	Parkhill, Ont	Poland Chinas.
McEachern Bros	Argyle, Ont	Chester Whites.
McBeth, R. S	Oak Lake, Man	Berkshires.
McKenzie, R	High Bluff, Man	Berkshires.
McGregor, Jos	Manitou, Man	Berkshires.
McLeod, K	Dugald, Man	Chester Whites.
McEwen, J	Kertch, Ont	Berkshires.
McEwen, Jas	Glendale, Man	Berkshires.
McKenzie, Bros	Scotch Block, Ont	Berkshires.
McCreery, Wm	Treherne, Man	Berkshires.
McKnight, J. S	Epping, Ont	Yorkshires.
McGill, J. A	Neepawa, Man	Berkshires.
McIntosh, Alva	Winchester Springs, Ont	Poland Chinas.
McIntyre, D. J	Lindsay, Ont	Tamworths
McDonald, Jno	Badjeros, Ont	Berkshires.
McDonald, R. N	Morganston, Ont	Berkshires.
McDonald, W. R	Ridgetown, Ont	Tamworths.
McNish, C. H	Lyn, Ont	Yorkshires
McMullin, R. B	Goldsmith, Ont	Poland Chinas.
McCutchen, H	Glencoe, Ont	Duroc Jerseys.

MEMBERS OF THE SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
McMullin, R. B	Blytheswood, Ont	Poland Chinas.
McLennan, W. D	Harriston, Ont	
Newstead, J. D	Preston, Ont	
Neil, F. H	Lucan, Ont.	Berkshires, Chester Whites.
Nicol, J. C	Hubrey, Ont	Tamworths.
North, Geo	Marden, Ont	Tamworths.
Nurse, C	Humber Bay, Ont	Tamworths.
Odell, W. H	Belmont, Ont	Tamworths.
Oliver, Wm	Komoka, Ont	Berkshires.
Ormsby, J. Y	Woodstock, Ont	Yorkshires.
Ott, J. R	Moorefield, Ont	Berkshires.
Page, J. E. & Son	Amherst, N. S	Poland Chinas Tamworths.
Parlee, M. H	Sussex, N. B	Berkshires.
Park, J. C.	Carnduff, Assa	Berkshires.
Patch, C. W	Brome, Que.	Chester Whites.
Patterson, Wm	Churchill, Ont	Berkshires.
Playfair, A. W	Baldur, Man	Berkshires.
Pettit, W. G.	Freeman, Ont.	Berkshires.
Pearson, S. J. & Son	Meadowvale, Ont	Berkshires.
Patch, Frank H	Brome, Que	Berkshires.
Pelletier, Silvio	Fraserville, Que.	Poland Chinas.
Pangman, Samuel	Vallentyne, Ont	Berkshires.
Park, John & Son	Burgessville, Ont	Duroc Jerseys.
Parks, E. & N	Oriel, Ont	Duroc Jerseys.
Park, Henry	Norwich, Ont.	Poland Chinas.
Pike, John	Locust Hill, Ont	Yorkshires.
Pineo, W. W	Waterville, N S	Berkshires.
Potter, A. B	Montgomery, Assa	Yorkshires, Berkshires.
Purves, Thomas	Pilot Mound, Man	Berkshires.
Porter, W. A	Moscow, Ont	Berkshires, Duroc, Jerseys.
Pomeroy, A. L.	Compton, Que	Berkshires.
Prouse, Wm	Ingersoll, Ont.	Tamworths.
Pettit, A. C	Freeman, Ont	Berkshires.
Paul, Jarvis	Florence, Ont.	Duroc Jerseys.
Racey, John	Lennoxville, Ont	Berkshires.
Revell, H	Ingersoll, Ont	Tamworths.
Reed, R. & Co	Hintonburg, Ont	Berkshires, Tamworths.
Richardson, J. A	South March, Ont	Tamworths.
Rice, Geo	Curries, Ont.	Poland Chinas.
Richardson, R. H	South March, Ont	Chester Whites.
Rogers, Geo. F.	Plumas, Man	Berkshires.
Row, W	Avon, Ont	Tamworths.
Ross, A. W	Douglas, Ont	Yorkshires, Berkshires.
Roberts, Geo	Hepworth Station, Ont	Duroc Jerseys.
Robinson, J. R	Manion, Ont	Berkshires.
Ronson, John W	Acacia, Ont	Berkshires.
Roper, James	Charlottetown, P. E. I	Berkshires.
Robertson, D. A	Logoch, Man	Berkshires.
Rusnell, F	Cedarville, Ont	Berkshires.
Russell, James A.	Precious Corners, Ont.	Berkshires.
Ruston, J. F.	Woodslee, Ont	Berkshires.
Row, F	Belmont, Ont	Tamworths.
Roberts, Harry	Sharbot Lake	Yorkshires.
Stratford, Joseph	Brantford, Ont	Chester Whites.
Shannon, Thomas	Cloverdale, B. C	Berkshires.
Shanks J. W	Rapid City, Man	Yorkshires.
Shaw, J. H	Simcoe, Ont	Berkshires, Chester Whites.
Shaw, A J C	Thamesville, Ont	Berkshires.
Snarev, B. & Sons	Croton, Ont.	Poland Chinas, Yorkshires.
Saunderson, Thomas	Holland, Man	Berkshires, Yorkshires.
Small, A., jr.	Melbourne, Ont	Berkshires.
Shaver, Sills & Son	Winchester Springs, Ont	Yorkshires.
Shannon, Jos. & Son	Cloverdale, B. C	Berkshires.
Snell, J. C.	Snelgrove, Ont	Berkshires.
Snell, J. G. & Bro	Snelgrove, Ont	Berkshires.
Shephardson, W. J	Walter's Falls, Ont	Berkshires.
Spencer, W. H	Morpeth, Ont.	Berkshires.
Spears, Thos	Oak Lake, Man	Berkshires.

MEMBERS OF THE SWINE BREEDERS' ASSOCIATION.—*Concluded.*

Name.	Address.	Class.
Semple, J. R	Brule, N. S	Berkshires.
Seymour, R. F	Essex, Ont	Berkshires.
Snyder, Gideon, jr	Jarvis, Ont	Berkshires, Chester Whites.
Semple, John	Tottenham, Ont.	Duroc Jerseys.
Smith, W. M. & J. C	Fairfield Plains, Ont	Duroc Jerseys, Poland Chinas
Simmons & Quirie	Ivan, Ont.	Berkshires.
Shrigley, John	Allandale, Ont	Berkshires.
Siefert, J. H.	North Bruce, Ont	Berkshires.
Smith, J. & Sons	Duntroon, Ont	Berkshires.
Shibley, W. J	Harrowsmith, Ont	Berkshires.
Simenton, J. H	Chatham, Ont	Tamworths.
Siprell & Carrol	Bornholm, Ont	Berkshires.
Smith, H. D.	Compton, Que	Yorkshires, Tamworths.
Stirtzinger, F. H	Fenwick, Ont	Poland Chinas.
Smith, Neil	Brampton, Ont	Tamworths.
Simpson Bros	Ridgetown, Ont.	Duroc Jerseys.
Simpson, Jos	Mooresville, Ont	Chester Whites.
Shibley, Jacob E.	Harrowsmith, Ont	Duroc Jerseys.
Scott, F. W	Highgate, Ont.	Yorkshires.
Smythe, R. L	Fargo, Ont	Poland Chinas.
Smyth, Jos. M.	Chatham, Ont	Poland Chinas.
Shipman, G H.	Cannington, Ont	Berkshires, Tamworths.
Snowball, R. A	Chatham, N.B	Chester Whites.
Taylor, J. & H	Richmond Station, Que	Yorkshires.
Tape Bros	Ridgetown, Ont	Duroc Jerseys.
Taylor, A. J	Glencoe, Ont	Chester Whites.
Teasdale, Thos	Concord, Ont	Berkshires.
Treverton, Chas	Belleville, Ont.	Tamworths.
Terrell, A	Wooler, Ont	Yorkshires.
Terhune, F. W	Brantford, Ont	Duroc Jerseys.
Tierheller. E. E	Mount Elgin, Ont.	Berkshires.
Trigger, C. W	St. Thomas, Ont	Berkshires.
Tierney, J. H	Norham, Ont	
Thompson, Geo	Bright, Ont.	Berkshires
Thompson, John	Uxbridge, Ont	Berkshires.
Thorndike, Wm	Oakwood, Ont	Tamworths.
Thompson, S. J	Carberry, Man	Berkshires.
Totter, A. B	Montgomery, Assa	Berkshires.
Thompson, Wm	White Rose, Ont	Berkshires.
Tunulty, W. J.	Madoc, Ont	Duroc Jerseys.
Trann, W. R	Crystal City, Man	Poland Chinas.
Topley, Wm	Morden, Man	Poland Chinas.
Vance, R.	Ida, Ont	Berkshires.
Vance, Ed.	Emerson, Man	Berkshires.
Watt, J. & W. B	Salem, Ont	Berkshires.
Walsh, Geo	Onslow Centre, Que	Tamworths.
Warrilow, John	Owen Sound, Ont	Chester Whites.
Wardell, J. B	Washington, Neb, U. S	
Wardell, G. H	Washington, Neb., U. S	
Walsh, Geo	Quyon, Que.	Tamworths.
Walter, John	Saltford, Ont	Berkshires.
Walter, James	Rosser, Man	Berkshires.
Watson, A. J.	Castlederg, Ont	Berkshires.
Waterworth, J. C	Wood Green, Ont	Berkshires.
Webster, R. A.	Andrewsville, Ont	Poland Chinas.
Wilson, W. C	East Oro, Ont	Yorkshires.
Wright, C. J	Dixville, Que	Berkshires, Poland Chinas.
Wilson, A. J., Mrs	Pittsfield, Ohio, U. S	Yorkshires.
Willis, R., jr	Glen Meyer, Ont	Poland Chinas.
Wilson, Finley	Franklin Centre, Que	Chester Whites.
Wrigley & Fox	Turgoose, B. C	Berkshires.
Wilkinson, J. T	Chilliwack, B. C	Yorkshires.
Wylie Bros, R. M	Cardinal, Ont.	Berkshires.
Yuill, Jos. & Sons	Carleton Place, Ont	Berkshires.
Young, A. W	Tupperville, Ont	Poland Chinas.
York, E J	Alvinston, Ont	Duroc Jerseys.
Young, F. P	Rivard Corner, Que	Poland Chinas.

ANNUAL REPORTS

OF THE

LIVE STOCK BREEDERS' ASSOCIATIONS

1897-98.

To the Honorable the Minister of Agriculture :

I have the honor to present to you the Report of the annual meetings of the Dominion Shorthorn Breeders, the Canadian Ayrshire Breeders and the Hereford Breeders' Associations for 1897 ; together with the reports of Hackney Horse, Clydesdale Horse, Shire Horse and Dominion Horse Breeders' Associations.

Your obedient servant,

HENRY WADE, Secretary,

DOMINION SHORTHORN BREEDERS' ASSOCIATION.

OFFICERS FOR 1898.

President—James Russell, Richmond Hill, Ont.

First Vice-President—John I. Hobson, Guelph, Ont.

Second Vice-President—Robert Miller, Brougham, Ont.

Ex-Presidents—Life Members—Hon. John Dryden, Brooklin, Ont.; Richard Gibson, Delaware, Ont.; A. Johnston, Greenwood, Ont.

Vice-Presidents from Provinces—William Linton, Aurora, Ont.; F. C. Bovyer, Georgetown, P.E.I.; J. H. Ladner, Ladner's Landing, B.C.; James A. Cochrane, Hillhurst, Que.; George A. Fawcett, Sackville, N.B.; John A. Turner, Millarville, Alta.; C. A. Archibald, Truro, N.S.; F. W. Green, Moose Jaw, Assa.; John E. Smith, Brandon, Man.

Board of Directors:

A List.	*B List.*	*C List.*
Edward Jeffs, Bondhead.	W. J. Biggins, Clinton.	H. Cargill, M.P., Cargill.
H. Smith, Hay.	David Rae, Fergus.	Alex. Smith, Maple Lodge.
T. E. Robson, Ilderton.	James Tolton, Walkerton.	John Isaac, Markham.
F. I. Patten, M D., St. George.	William Dawson, Vittoria.	W. G. Pettit, Freeman.
Jas. M. Gardhouse, Highfield.	John Davidson, Ashburn.	C. M. Simmons, Ivan.

Executive and Finance Committee—James Russell, Richmond Hill, Ont., President; John I. Hobson, Guelph, Ont.; William Linton, Aurora, Ont.; Robert Millar, Brougham, Ont.; Arthur Johnston, Greenwood.

Delegates to Industrial Exhibition—Hon. John Dryden, Brooklin, Ont.; John I. Hobson, Guelph, Ont.

Delegates to Western Fair—Henry Smith, Hay, Ont.; C. M. Simmons, Ivan, Ont.

Delegates to Central Fair, Ottawa—R. R. Sangster, Lancaster, Ont.; D. McLaren, Dunmore, Ont.

Delegates to Provincial Exhibition, Nova Scotia—C. C. Chase, Church street, Cornwall, N.S.; W. H. Holmes, Amherst, N.S.

Delegates to Provincial Exhibition, New Brunswick—Senator Josiah Wood, Sackville, N.B.; George A. Fawcett, Sackville, N.B.

Delegates to Provincial Exhibition, Prince Edward Island—F. S. Hazzard, Charlottetown, P.E.I.; F. G. Bovyer, Georgetown, P.E.I.

Secretary and Editor (to whom all communications are to be sent)—Henry Wade, Parliament Buildings, Toronto.

DOMINION SHORTHORN BREEDERS' ASSOCIATION

FOR 1897-8.

LIST OF MEMBERS.

Name.	Address.
Adams, William	High River, Alta.
Ager, George	Islington.
Alexander, D	Brigden.
Allin & Sons, Samuel	Bowmanville.
Allin & Bros., Thomas	Oshawa.
Alliston, John	Thames Road.
Alton & Sons, Thomas	Appleby.
Alton, A. P	Appleby.
Alton, William E.	Nelson.
Anderson, Thomas	Dungannon
Anderson, Thomas	Mount Forest.
Anderson, William	Whitby.
Andrews, A. F	Moosomin, Assa.
Andrews, Joseph	Hamiota, Man.
Archibald, C. A	Truro, N.S.
Arkell, Henry	Arkell.
Arkell, Peter	Teeswater.
Armstrong, William	Mosside.
Arnold & Son, H. G	Maidstone Cross.
Ayearst, H. O	Middle Church, Man.
Baker, F. C. & William	Binscarth, Man.
Baker, Frederick	Dashwood.
Baker, Thomas	Solina
Barclay, Luther	Port Hope.
Barron, John G	Carberry, Man.
Bate, Joel	Moose Jaw, Assa.
Bathgate, Peter	Eramosa.
Battell, W. J	Moose Jaw, Assa.
Batty, Robert	Meaford.
Beatty, George	Red Deer, Alta.
Beatty, James	Red Deer, Alta.
Beaumont, James J	Alport.
Beggs, John	Clare, Assa.
Bell, Guy	Brampton.
Bell, James	Lauriston,
Bell, John	Seeburn, Man.
Bell, Joseph	Bradford.
Benner, W. R	Alvinston.
Benson, H. D	Ladner's Landing, B.C.
Betzner, Ephraim S	Conestogo.
Bice, Artemus	Clandeboye.
Biggins, W. J	Clinton.
Birdsall & Son, F	Birdsall.
Birrell, David	Greenwood.
Blanshard, C	Appleby.
Blanshard, David E	Appleby.
Blyth, Robert	Marden.
Bolton, James	Dewdney, Alta.
Bone, Adam	Paris.
Bonnycastle & Son, F	Campbellford.
Botterill, E. H	Cochrane, Alta.
Boulter, & Sons, William	Picton.
Bovyer, F. G	Georgetown, P.E.I.
Bowman, W. R	Mount Forest.
Bradcom, E. W	Mount Forest.
Brady, Thomas	Chatham.
Brandon, William	Napanee.
Brash, William	Ashburn.
Bratt, Jesse	Yellow Grass, Assa.
Bray, Jonathan	Raglan.
Bricker, John	Elmira.
Brien, Ed	Ridgetown.
Bright & Sons, W	Raglan.
Bristow, George B	Rob Roy.
Broadfoot, James	Seaforth.
Brodie, G. A	Bethesda.
Brown, A. & D	Iona.
Brown, James	Norval.
Brown, James	Thorold.
Brown, Joseph	Adelaide.
Brown, R	Orono.
Brubacher, M. E	St. Jacobs.
Burch, D. B	Lambeth.
Bunker, F	Pickering.
Bunker, S. C	Pickering.
Burchall, R	Coboconk.
Burnett, Leonard	Greenbank.
Burns, Alexander	Rockwood.
Burns, David	Brooklin.
Burridge, Albert G	Rutherford.
Burton, Robert	Lennoxville, Que.
Burt, Robert	St. George.
Calder, Charles	Brooklin.
Calder, Wm	Glanford.
Caldwell, Alfred	Crown Hill.
Cameron, John	Crieff.
Cameron, John A	Carlyle, Assa.
Campbell Bros., J	Crosshill.
Campbell, James K	Palmerston.
Campbell John	Woodville.
Campbell, Joseph	Janetville.
Campbell, Mac	Northwood.
Campbell, Peter	Amberley.
Campbell, Roland	Dunbarton.
Campbell, W. B	Campbellcroft.
Canadian Land & Ranch Co.	Crane Lake, Alta.
Cargill & Son, H	Cargill.
Carnochan, Wm	Egmondville.
Carruthers, C. & J	Cobourg.
Carruthers & Son, H	Cobourg.
Carswell, James	Renfrew.
Cassidy, Neil	Port Elgin.
Caswell, J. J	Osler, Sask.
Central Canada Ex. Co	Ottawa.
Central Experimental Farm	Ottawa.
Chadburn, A. & J	Ralphton, Man.
Chalmers, Wm	Hayfield.

LIST OF MEMBERS.—*Continued.*

Name.	Address.
Chambers, Wm	Currie's Crossing.
Charters, Robert	Egmondville.
Chase, E. & O	Church St., Cornwallis, N.S.
Cheyne, James	Oxboro', Assa.
Chinnick, J. & E	Chatham.
Clark, David	Botteneau, N.D., U.S.
Clark, Wm	Greenwood.
Claus, W. W	Vineland.
Clayton, George	Peepabun.
Cleghorn, J. W	Mosboro.
Cleveland, C. C	Danville, Que.
Coad & Sons, R	Strathburn.
Coakwell, William	Green River.
Cochrane, Hon. M. H	Hillhurst, Que.
Coghlan, George	Eramosa.
Colquhoun, Thomas	Gowrie.
Connolly, John	Lindsay.
Cook, A. L	Corinth.
Cook, James	Myrtle.
Cook, jr., John	Amulree.
Cooper, J. V	Picton.
Copland, Thomas	Saskatoon, Sask.
Cords, Frederick	Walkerton.
Corneil, D. H	Omemee.
Cousins & Son, John	Harriston.
Cowan & Sons, James	Galt.
Cowan, James	Guelph.
Craig, J. A	Portage La Prairie, Man.
Cram, John	Deloraine, Man.
Creamer, A. E	Baldur, Man.
Crerar & Sons, James	Shakespeare.
Cross, A. E	Calgary, Alta.
Crozier, John	Meadowvale.
Cudmore & Son, Thomas	Lumley.
Cullis, John & W. H	Powle's Corners.
Cummings, John	Rockwood.
Cuntz, Charles	Shoal Lake, Man.
Cutler, Elis & Son	Coldstream.
Doering, Henry	Milverton.
Dale, William	St. Marys.
Darke, Richard	Lindsay.
Daubney, F. E	Deloraine, Man.
Dannais, C. M	Battleford, Sask.
Davidson, J. Fred	Peterborough.
Davidson, James I	Balsam.
Davidson, John	Ashburn.
Davis, Edward	Emerson, Man.
Davis, C. J	Freeman.
Davis, H. J	Woodstock.
Davis, J. F	Tempo.
Dawson, William	Vittoria.
Day, John F	Fleming, Assa.
Deans, William J. & L	Fergus.
De Courcey, Daniel	Bornholm.
Dickie, George	Hyde Park.
Dickieson, W. A	Eramosa
Dickison, William	Mildmay.
Dickson, John M	Innisfail, Alta.
Dixon Bros	Maple Creek, Assa.
Dobson, Robert	Epsom.
Dodds, John	Arkwright.
Doidge, George	Plainville.
Donaldson, William	South Zorra.
Dorrance, James	Seaforth.
Douglas, James	Caledonia.
Douglas & Sons, Thomas	Strathroy.
Douglas & Switzer	Kintore.
Doyle, John	Elora.
Doyle, Maurice	Ayton.
Doyle, R. J	Owen Sound.
Dredge & Son, William	Nassagaweya.
Drummond & Sons, John	Clifford.
Dryden, Hon. John	Brooklin.
Duckworth, John	Vanessa.
Duff, Robert	Myrtle.
Dugan, James	Castleavery, Man.
Dunlop, Samuel	Eady.
Duthie, James	Melgund, Man.
Dyer, D. D	Columbus.
Dyer, John E	Enfield.
Eby, Reuben	Winfield.
Edwards Bros	Watford.
Edwards & Co., W. C	Rockland.
Elgie, Joseph	Dawn Mills.
Elliott, H. J	Danville, Que.
Elliott, W. R	Hespeler.
Elrick, William	Hillsdale.
Evans, A	Chilliwack, B.C.
Fairburn, H. K	Thedford.
Fallows, H. S	Evelyn.
Farr, C. A	Petrolea.
Ferguson, James	Thamesville.
Ferres & Sons, James	Whitfield.
Ficht, Valentine	Oriel
Fisher, William	Ashgrove.
Fitzgerald Bros	Mt. St. Louis.
Flatt, D. C	Millgrove.
Flatt, W. D	Hamilton.
Fleming, J. Alexander	Kilsyth.
Fletcher, John	Binkham.
Foley, R. D	Manitou, Man.
Forrest, M.D., R. W	Mt. Albert.
Forth Bros	Glen Buell.
Foster, Stewart	Killarney, Man.
Found, James	Dunbarton.
Fraser & Sons, D	Emerson, Man
Fraser, R. P	Minnedosa, Man.
Freestone & Son, C	Meaford.
Fried & Son, John	Roseville.
Fry, William	Sutton West.
Fulton, William	Brewster.
Furse Bros	Kintore.
Futcher & Son, Thomas	St. Thomas.
Gainer, W. H	Welland.
Gallagher, Robert	Perm.
Gardhouse, James M	Highfield.
Gardhouse, John	Highfield.
Gardiner, James	Grange, Man.
Gardner, F. A	Britannia.
Gardner, William	Ashburn.
Gaunt & Sons, E	St. Helens.
George, John	Miami, Man.
Gibb, James	Brooksdale.
Gibson, John T	Denfield.
Gibson, Richard	Delaware.
Gibson, William	Wolesley, Assa.

LIST OF MEMBERS.—*Continued.*

Name.	Address
Giddis, Willis	Ridgetown.
Gier, Gow	Grand Valley.
Griffin, Alexander	Snelgrove.
Gilbert, Matthew	St. Thomas.
Gimby, M.D., W. E	Chesley.
Glen, Robert	Owen Sound.
Golding, Henry	Thamesford.
Goodfellow Bros	Macville.
Good, Thomas	Richmond.
Gordon, John	Derryville.
Gordon, Thomas	Nottawa.
Gorwell, S. B	Fanshawe.
Gowanlock, James	Port Elgin.
Gowanlock, John	Port Elgin.
Gowanlock, Robert	Maple Hill.
Graham, Andrew	Pomeroy, Man.
Graham, Thomas	Port Perry.
Graham, William	Port Perry.
Grainger & Son, William	Londesborough.
Grainge, Edward	Duncrief.
Green, Fred W	Moosejaw, Assa.
Greenway, Hon. Thomas	Crystal City, Man.
Greenway, Thomas	Woodville.
Greenwood, Thomas	Douglas, Man.
Griffith, J. & G	Wallace.
Groff, Israel	Alma.
Hager, A	Plantagenet.
Haining Bros	Highgate.
Hall, Michael	Wishart, Assa.
Hall, William	Cambray.
Hanley, J C	Reid.
Hardy, J. & G	Ashgrove.
Hardy, John A	Kent Bridge.
Hargrave, James	Medicine Hat, Assa.
Harrison & Son, John	Niverville, Man.
Hartman, J. W	Elmhedge.
Harvie, J. R	Orillia.
Hastings, Robert	Wingham.
Hay, William	Tara.
Heacock, George	Aurora.
Heddle, James	Wilkesport.
Helliwell, W. J	Oak Lake, Man.
Hendrie, William	Hamilton.
Hermiston, Robert	Mt Forest.
Hill, David	Staffa.
Hill, George	Delaware.
Hillhouse, R	Broadview, Assa.
Hillis, James	Hanover.
Hind, H E	Hagersville.
Hislop, John	Brussels.
Hobson, John I	Guelph.
Hodgens & Son, Thomas	Ettrick.
Hoffarth, Joseph	Carlsruhe.
Hogg, William	Thamesford.
Holdsworth & Son, R. L	Port Hope.
Hole Bros	Minnedosa, Man.
Hollingshead, J	Tottenham.
Holmes, Charles W	Amherst, N. S.
Holmes & Moore	Inwood.
Hope & Sons, T	Scugog.
Hortop, J. W	Kinsale.
Hosken, John	Bowmanville.
Hostetter, C	New Hamburg.
Houston, John	Chatham.
Howard, John L	Sutton West.
Howden, W. G	Columbus.
Hysop & Son, David	Killarney, Man.
Innes & Son, James	Curries.
Ireland, George	Nelson.
Irving, C. Harlstone	Newmarket.
Isaac, John	Markham.
Isaac, S. C	Baltimore.
Jackson, George	Cumnock.
James, Walter	Rosser, Man.
Jamieson, David	Hillsdale.
Jamieson, John	Kirkwall.
Jamieson, John	Shrigley.
Jamieson, William J	Laurier.
Jasper, Thomas	Bradwardine, Man.
Jeffrey Bros	Whitby.
Jeffs & Son, Edward	Bond Head.
Jesten, John	Everton.
Johnston, Arthur	Greenwood.
Johnston, Arthur	Vandeleur.
Johnston & Bros., John	Rutherford.
Johnston, F. W	Denver, Col., U. S.
Johnston, George A	Balsam.
Johnston, H. M	Calder.
Johnston, Henry	Tara.
Johnston, James	Nortonville.
Johnston, James H	Hillsdale.
Johnston, Samuel	Redgrave.
Jones Bros	Yellow Grass, Assa.
Julien, Thomas	Heathcote.
Kay, C	Fergus.
Kealy, O. W	Battleford, Sask.
Kearns, John	Palmerston.
King, William	Minnokin, Man.
Kinnear, L. H	Souris, Man.
Kirkland, Est. John	Ladner, B C.
Kitely, J. J	Dunkerron.
Knox, Andrew	South Dummer.
Knox, William	South Dummer.
Kolb, Elias B	Berlin.
Kyle, James	Chesley.
Ladner, W. H	Ladner, B.C.
Laird, Richard	Thedford.
Lang, R L	Oak Lake, Man.
Laviolette, Charles	Virginia.
Lawrence, Joseph	Clearwater, Man.
Lawrence, J. R	Humber.
Lawe, J. C	Avon.
Laycock, Henry	Rosebank, Man.
Learned, J. F	Cookshire, Que.
Leask, J	Taunton.
Leask, Peter A	Virden, Man.
Leask, William	Dominion City, Man.
Leask, William G	Virden, Man.
Lee & Sons, John	Highgate.
Legge, T. H	Temperanceville.
Leonard, W. Barrett	Russell, Man.
Lennox, James A	Thornton.
Leslie, George	Acton.
Lewis, George C	Kissina, Assa.
Linton, William	Aurora.
Lister, W. S	Middle Church, Man.
Litt, Jacob	Sebringville.

LIST OF MEMBERS.—*Continued.*

Name.	Address.
Littlejohns, J. C	Highgate.
Livingstone, Donald	Yorkton, Assa.
Logie, H. C	Lindsay.
Loree, George O	Everton, Man.
Lowes, Caleb	Bosworth.
Lynch, Walter	Westbourne, Man.
Lynn, Charles	Clandeboye.
Main, James	Pentland.
Mansfield, Jonathan	Brandon, Man.
Marks, Wm	Little Britain.
Marquis, George	Victoria Corners.
Marshall, James A	Binbrook.
Marshall, Joseph	Jackson.
Martin, Arthur	Maple Creek, Assa.
Martindale, F	York.
Martin, John W	Fenelon Falls.
Martyn, J. W	Canton.
Matchett, Richard	Cavan.
Menzies Bros	Shoal Lake, Man.
Menzies, John	Shoal Lake, Man.
Menzies, W. & J	Kirkwall.
Mercer, Thomas	Markdale.
Meyer, John	Kossuth.
Miller & Sons, John	Brougham.
Miller, James	Aikenside, Man.
Miller, John	Markham.
Miller, Mrs. John	Milton.
Milliken & Sons, Wm	Hagerman's Corners.
Millman, Wm	Dexter.
Milne, David	Ethel.
Milloy, Capt. D	Paris.
Minor, G. D	Sparta.
Minthorn, Albert E	Powle's Corners.
Mitchell, James	Aberdour.
Mitchell, James	Castleavery, Man.
Mitchell, John	Waterdown.
Mitchell, R	Nelson.
Moffatt, John O	Pilot Mound, Man.
Moffatt, W. G	Teeswater.
Monk, Ephraim	Springford
Monroe, John A.	Springbank, Alberta.
Moore, Alex	Greenwood.
Moore, J. W.	Manitou, Man.
Morgan & Sons, John	Kerwood.
Morrison, John	Brooklin.
Morrison, John	Winthrop.
Morrow, James	Silver Springs, Man.
Morton, M.D., E. D	Barrie.
Moyer, George O.	St. Clements.
Mulholland, J. T	Baltimore.
Murray, Charles	Stamford.
McAllister, D	Comber.
McArthur, A. J	Paisley.
McArthur, James	Gobles.
McArthur, John	Paisley.
McAvoy, T. C	Balsam
McBeth, Donald	Oak Lake, Man.
McCaig, Alexander	Aberfoyle.
McCallum, John	Iona Station.
McCallum, J. R.	Iona Station.
McCallum, Zachariah	Iona.
McCartney, Walter E	Milton.
McColl, Samuel	Dutton.
McCorkell, W. A.	Fleming, Assa.
McCorkindale, John	Guelph.
McCormick, Henry	Paris.
McCullough, R. C	Georgetown.
McCullough, Robert	Queen Hill.
McCurdy, S. D	Vienna.
McDermott, W. & G.	Living Springs.
McDonald Bros	Woodstock.
McDonald, D. K	Speedside.
McDonald, Wm	Pilot Mound, Man.
McEachern Bros.	Argyle.
McEwan, John	Delaware.
McFarland, Jas	Dutton.
McFarland, Joseph	Hockley.
McGarry, Wm.	McGarry.
McGillawel, James.	Amulree.
McGill Bros	Caroll, Man.
McGill, A. F	Hillsburg.
McGregor, John	Manitou, Man.
McGurk, Henry	Colinville.
McIntosh, Wm	Burgoyne.
McIntyre, Archie	Campbellville, Man.
McIntyre, Ewen	St. Thomas.
McIvor, John	Cape Croker.
McIvor, Kenneth	Virden, Man.
McKay Bros.	Kippen.
McKay, Mathias	Delaware.
McKechnie, N. G. & J	Durham.
McKenzie, Cooper	Battleford, Sask.
McKenzie, Adam	Brooksdale, Man.
McKenzie, Alexander	Coningsby.
McKenzie, James	Burnside, Man.
McKenzie, John	Chatsworth.
McKenzie, sr., Kenneth	Burnside, Man.
McKenzie, jr., Kenneth	Burnside, Man.
McKimmell, J. A	Cochrane, Alberta.
McKinnon, Alexander	Coningsby.
McKinnon, D. J	Queen Hill.
McLaren, D	Dunmore.
McLaren, Duncan	Cromarty.
McLean, John L	Colinville.
McLean, Robert	Ellisboro', Assa
McLenaghan, R	Minnedosa, Man.
McLennan, Roderick	Moropano, Man.
McMillan, D	Dutton.
McMillan, James A	Calgary, Alberta.
McMurray, Robert.	Sunnidale.
McNab, John	Rockwood.
McNeill, J. C	Cavan.
McNeill, J. & C	Cavan.
McPherson, Wm.	Arkona.
McQuat, John	Stony Mountain, Man
McQueen, J. & R	Salem.
McRae, John	Teeswater.
McTaggart	Sonya.
McTavish & Son, Peter	Gad's Hill.
McTavish, Donald	Gad's Hill.
Naisbitt, Bright	Rapid City, Man.
Naisbitt, Wm	Rapid City, Man.
Neilson, Allan	Napanee.
Nelles, F. A.	York.
Nichol, Robert.	Hagersville.
Nicholson, R. & S	Sylvan.
Noble, Francis	Wawanessa, Man.
Norris Bros	Ravenshoe.
Nott, Thomas	McLennan, Algoma.
Oliver, George	Galt.

LIST OF MEMBERS.—*Continued.*

Name.	Address.
Oliver, Wm	Avonbank.
Ontario Agr. College	Guelph.
Orr, Alexander	Ralphtown, Man.
Owens, Wm.	Montreal, Que.
Paramer, W. J	Pigeon Lake, Man.
Park, Henry	Durham.
Park, James	Vickers.
Parkinson, E. & C	Thornbury.
Paterson, A. C.	Lucknow.
Patterson, F. I.	St. George.
Patterson, J. W	Denfield.
Payne, J. C	Cayuga.
Pearson & Son, F. G	Meadowvale.
Pemberton & Son	Victoria, B.C.
Pentland, T. J.	Aikenside, Man.
Perdue, Henry	Campbell's Cross.
Pettigrew, Henry	Norval.
Pettit, W. G.	Freeman.
Philp, R. W	Cadmus.
Phin, R. J.	Moosomin, Assa.
Playfair, A. W	Baldur, Man.
Porter, Mrs. Charles E	Petrolea.
Porter, Wm	Lloydtown.
Potter, Hugh A	Caledon.
Powers & Son, S	Orono.
Preston, Richard	Leamington.
Pritchard, R. J	Prince Albert, Sask.
Prout, George W	Zephyr.
Pugh, David E	Claremont.
Pugh, George E	Whitevale.
Pugh, Hugh	Whitevale.
Querengesser, C	Brodhagen.
Rae, David	Fergus.
Raikes, George	Barrie.
Raikes, Henry	Pine Lake, Alberta.
Ramsay & Son, Wm	Eden Mills.
Rankin, Charles	Wyebridge.
Rankin, George	Hamiota, Man.
Rankin, Samuel	Fairview.
Rawlins, Heber	Forest.
Redmond, Wm	Millbrook.
Reid, E. Osborne	Cochrane, Alberta.
Reid, George A	Cochrane, Alberta.
Reid, Robert	Forrest Station, Man.
Reiner, S. F	Neustadt.
Rennie, James.	Wick.
Renton, John	Deloraine, Man.
Reynolds, Martin	Harriston.
Riddle, James	Beeton.
Robb, Peter B	Neepawa, Man.
Robertson, Archibald	Eden Mills.
Robertson, A. R	Nithburg.
Robertson, John	Wyoming.
Robertson, Joseph	Romney.
Robinson, Charles	Odelltown, Que.
Robinson, Thomas	Kintore.
Robson, J. G	Ilderton.
Robson, J. S	Manitou, Man.
Robson, T. E	Ilderton.
Ross, J. A	Maple Creek, Assa.
Ross, J. S	Moosejaw, Assa.
Routledge, Andrew	Lambeth,
Routledge, J. Turner	Georgeville, Que.
Rowand, James	Dumblane.
Rusnell, D. H	Stouffville.
Russell, J & W	Richmond Hill.
Russell & Sons, Thomas	Exeter.
Ruston & Sons, F	Sebringville.
Rutherford, Joseph	Boice, N.Y.
Rutherford, Wm.	South Monaghan.
Sadler, John	Columbus.
Salkeld, John L	Dongola, Assa.
Sangster, R. R.	Lancaster.
Scarlett, H. H	Florence.
Scott, F. W	Highgate.
Scott, John	Ivan.
Scott, Robert	Neepawa, Man.
Scott, Thomas	Sutton West.
Secord, James R. R	Homer.
Semple, James.	Hereward.
Shanks, James W	Rapid, City, Man.
Shantz, Solomon	Haysville.
Sharman. Sharman	Souris, Man.
Sharpe, J. & W	Lacombe, Alberta.
Shaver, Frederick	Little Britain.
Shaw, A. J. C	Thamesville.
Shaw, Henry	Colinville.
Shibley, James E	Harrowsmith.
Shier, Wm	Sunderland.
Shore Bros.	White Oak.
Short, Hugh	Oustic.
Sibbald, M.D., F. C	Sutton West.
Simmons, C. M	Ivan.
Skeoch, James	Corunna.
Skillette, T. A.	Grenfell, Assa.
Skinner, Thomas	Katepwe, Assa.
Smith, A. C	Hagersville.
Smith, Amos	Trowbridge.
Smith A. W	Maple Lodge.
Smith, David	Maple Leaf.
Smith, Henry	Russell, Man.
Smith, H. & W	Hay.
Smith, James	Inglis Falls.
Smith & Sons, John	Duntroon.
Smith, John E.	Brandon, Man.
Smith, Wm	Columbus.
Smyth Henry R.	Chatham.
Snary & Sons, Bilton.	Croton.
Snary, Henry	Croton.
Snell, James	Clinton.
Snider, Jacob S	Bloomingdale.
Snyder, Isaac	Acton.
Sockett, John	Rockwood.
Somerville, William	Montifore, Man.
Spears, R	Battleford, Sask.
Spears, Thomas	Oak Lake, Man.
Squire, Samuel W	Owen Sound.
Srigley, John	Allandale.
Stalker, John	Acton.
Stancombe, James	Cartwright, Man.
Staples, George	Lifford.
Steele, James	Lochalsh.
Steele, James T	Hullcar, B.C.
Stewart, Angus	Westbourne, Man.
Stewart, Peter	Atha.
Stock, C. H	Waterdown.
Stock, W. E	Waterdown.
Stocks, James	Columbus.

LIST OF MEMBERS.—*Concluded.*

Name.	Address.
Stockwell, C. F	Danville, Que.
Strowbridge, H. L	Cookshire, Que.
Strothers, William	Grayburn, Assa.
Strothers, William	Maple Creek, Assa.
Stutt, John A	Fairmede, Assa.
Sutherland, E	Bennington.
Sutor, George	Beaverton.
Sutton, William	Ospringe.
Switzer, Joseph A	Norval.
Talbot, Daniel	Everton.
Talbot & Sons, P	Lacombe, Alta.
Taylor, Gilbert	Mildmay.
Taylor, Joseph	Fairfax, Man.
Taylor, W. H	Parkhill.
Telfer, William O	Telfer.
Thompson, Nathaniel	Orangeville.
Thomson, Andrew	Fergus.
Thomson, A. R	Stamford.
Thomson, James	Belton.
Thomson, James	Mildmay.
Thomson, Purves	Pilot Mound, Man.
Thomson, Robert	St. Marys, Ont.
Titus, A. A	Napinka, Man.
Toles, Peter	Mount Brydges.
Tolton, James	Walkerton.
Todd, T. R	Hillview, Man.
Tucker, George	Bosworth.
Turner, J. H	Bottineau, N. Dak.,
Turner, John A	Millarville, Alta.
Turner, Robert	Millarville, Alta.
Tyrwhitt, Lieut.-Col. R	Bradford.
Usher, Thomas	Campbelltown, Man.
Van Nostrand, Est. of John	Vandorf.
Varnum, E. N	Solina.
Waddington, T. B	Brandon, Man.
Wallace, W. H	Mt. Forest.
Walters, James	Lacombe, Alta.
Wannop, James L	Creeford, Man.
Ward, Joseph	Marsh Hill.
Warnica, Angus	Craigvale.
Warnica, Frederick M	Painswick.
Warnica, J. L	Painswick.
Warren, John	Acton.
Washington, J. G	Ninga, Man.
Watson, A. J	Castlederg.
Watson, John H	Snelgrove.
Watson, Joseph	Greenbank.
Watson, Estate of William	Dalesboro', Assa.
Watt, Alexander	Shanty Bay.
Watt, J. & W. B	Salem.
Webb, James	Ospringe.
Webster, H. B	Fergus.
Webster, John	Fordyce.
Weir, J. H	Crumlin.
West, George R	Ridgetown.
Westover, O. L	Luton.
Whetham, John	Kirkwall.
White, A. T	Pembroke.
White, James	Leaside Junction.
White, Robert	Wakopa, Man.
Whitelaw, A. & W	Guelph.
Whitson, Robert	Atha.
Widdifield, J. W	Siloam.
Wilkinson, Major-Gen. H. C.	Birtle, Man.
Williams, Richard	Craighurst.
Wilson, D. J. D	Seaforth.
Wilson, James	Dugald, Man.
Wilson, James	Innisfail, Alta.
Wilson, J. L	Gorrie.
Wilson, R. M	Marringhurst, Man.
Wilson, William	Brampton.
Wilson & Sons, John	Green River.
Wise & Sons, William	Clinton.
Wood & Anderson	Coulee, Assa.
Wood, Hon. Josiah	Sackville, N.B.
Wright, Andrew	St. Eustache, Que.
Wright, Herbert	Guelph.
Young, William	Waubuno, Man.
Young, W. M	Whitby.
Young, Charles	Brooksdale, Man.

TWELFTH ANNUAL MEETING

OF THE

DOMINION SHORTHORN BREEDERS' ASSOCIATION.

DIRECTORS' MEETING.

This meeting was held in the Albion Hotel, Toronto, on Tuesday the 8th of February, 1897, at 8 p.m.

The following members were present: Arthur Johnston, President, Greenwood; John I. Hobson, Guelph; Robert Miller, Brougham; Jas. Russell, Richmond Hill; William Linton, Aurora, Ont.; F. G. Bovyer, Georgetown, P.E.I.; C. A. Archibald, Truro, N.S; W. J. Biggins, Clinton; David Rae, Fergus; Wm. Dawson, Vittoria; John Davidson, Ashburn; Alex. Smith, Maple Lodge; W. G. Pettit, Freeman; C. M. Simmons, Ivan; Edward Jeffs, Bond Head; H. Smith, Hay; T. E. Robson, Ilderton; F. I. Patten, M.D., St. George; and Henry Wade, Secretary.

REPORT OF THE SECRETARY AND EXECUTIVE COMMITTEE.

The Secretary then read the following report:

TORONTO, February 8th, 1898.

The Executive Committee beg to present the twelfth annual report of the affairs of this Association as furnished by the Secretary for the year ending 31st December, 1897.

REGISTRATIONS.

In 1897 we were paid for 4,128 registrations, 4,246 certificates, and 620 changes of ownership; against, in 1896, 2,957 registrations, 3,017 certificates, and 379 changes of ownership; against, in 1895, 3,000 registrations, 3,100 certificates, and 450 changes of ownership; and against, in 1894, 3,045 registrations, 3,142 certificates, and 493 transfers; and against, in 1893, 3,484 registrations, 3,142 certificates, and 587 transfers.

REGISTRATION FEES.

Following up the change in registrations, as a matter of course there is a corresponding change in registration fees. In 1891 we received $3,152.50; in 1892, $3,835.25; in 1893, $3 787 45; in 1894, $3,357 75; in 1895, $3,222.00; in 1896, $2,954.00; in 1897, $4,124.25, an increase of $1,170.25 over 1896.

HERD BOOKS.

Vol. I.—There were sent out in 1887, 550 volumes; in 1888, 51 volumes; in 1889, 33 volumes; in 1890, 19 volumes; in 1891, 21 volumes; in 1892, 27 volumes; in 1893, 18 volumes; in 1894, 20 volumes; in 1895, 1 volume, also 161 volumes burnt; in 1896, 3 volumes; and in 1897, 2 volumes; leaving on hand, 94 volumes.

Vol. II.—There were sent out in 1888, 451 volumes ; in 1889, 39 volumes ; in 1890, 26 volumes ; in 1891, 16 volumes ; in 1892, 20 volumes ; in 1893, 14 volumes ; in 1894, 16 volumes ; in 1895, 2 volumes, also 118 volumes burnt ; in 1896, 6 volumes ; and in 1897, 5 volumes ; leaving on hand, 287 volumes

Vol. III.—There were sent out in 1888, 226 volumes ; in 1889, 189 volumes ; in 1890, 46 volumes ; in 1891, 16 volumes ; in 1892, 19 volumes ; in 1893, 10 volumes ; in 1894, 17 volumes ; in 1895, 4 volumes, also 74 volumes burnt ; in 1896, 4 volumes ; and in 1897, 7 volumes ; leaving on hand, 388 volumes.

Vol. IV.—There were sent out in 1889, 302 volumes ; in 1890, 105 volumes ; in 1891, 29 volumes ; in 1892, 21 volumes ; in 1893, 5 volumes ; in 1894, 13 volumes ; in 1895, 4 volumes, also 122 volumes burnt ; in 1896, 9 volumes ; and in 1897, 8 volumes ; leaving on hand, 382 volumes.

Vol. V.—There were sent to members in 1890, 134 volumes ; in 1891, 130 volumes ; in 1892, 78 volumes ; in 1893, 39 volumes ; in 1894, 33 volumes ; in 1895, 9 volumes, also 206 volumes burnt ; in 1896, 14 volumes ; and in 1897, 10 volumes, leaving on hand, 347 volumes.

Vol. VI.—There were sent out in 1891, 345 volumes ; in 1892, 29 volumes ; in 1893, 32 volumes ; in 1894, 29 volumes ; in 1895, 9 volumes, also 165 volumes burnt ; in 1896, 18 volumes ; and in 1897, 23 volumes ; leaving on hand 350 volumes.

Vol. VII.—There were sent out in 1892, 318 volumes ; in 1893, 28 volumes ; in 1894, 33 volumes ; in 1895, 17 volumes, also 241 volumes burnt ; in 1896, 24 volumes ; and in 1897, 27 volumes ; leaving on hand 312 volumes.

Vol. VIII.—There were sent out in 1893, 304 volumes ; in 1894, 38 volumes ; in 1895, 25 volumes, also 258 volumes burnt ; in 1896, 40 volumes ; and in 1897, 46 volumes ; leaving on hand, 289 volumes.

Vol. IX.—There were sent out in 1894, 269 volumes ; in 1895, 46 volumes, also 312 volumes burnt ; in 1896, 45 volumes ; and in 1897, 57 volumes ; leaving on hand, 291 volumes.

Vol. X.—There were sent out in 1895, 317 volumes, also 40 volumes burnt ; in 1896, 68 volumes ; and in 1897, 59 volumes ; leaving on hand 516 volumes.

Vol. XI.—There were sent out in 1896, 249 volumes ; in 1897, 83 volumes ; leaving on hand 668 volumes.

Vol. XII.—There were sent out in 1896, 148 volumes ; and in 1897, 122 volumes ; leaving on hand, 730 volumes.

Vol. XIII., containing all the pedigrees recorded in 1896, has been completed, and 149 volumes sent out, leaving on hand 851 volumes.

Vol. XIV. has been completed, and will contain all the pedigrees recorded in 1897, and, as in Volume VII. and subsequent volumes, each pedigree can be traced in its entirety by referring to the pedigree of another animal in the same volume, making the volume complete in itself. In this volume the cows are printed under the name of each owner. This plan debars us from numbering the females at the time of recording. It will be sent out when printed.

EXTRACTS FROM BY-LAWS.

Section 1.—Persons desirous of becoming members shall so notify the Secretary, pay the entrance fee, and agree, if elected, to conform to the rules of the Association, and not to withdraw without paying all fees due, and giving three months' notice of their intention of doing so.

Section 2.—Members shall pay an entrance fee of $2.00, and subsequently an annual subscription of $2.00, which annual subscription shall be due and payable on the first of January of each year.

New By-Law.—That all calves dropped after January 1st, 1889, shall in future be registered within twenty-four months of birth, and if not so registered, enlarged fees shall be charged for their registration.

Section 15.—Fees.—Charges for registration will be:

To members, registration and certificate......	$0 75	for each animal.
To non-members, registration and certificate...	1 25	" "
Over age, to members (in all cases a certificate goes with registration)	1 00	" "
Over age, to non-members (in all cases a certificate goes with registration)	1 75	" "

Change of ownership, 25c.; duplicate certificate, 25c.
Back volumes of herd books, $2 00 each.

HENRY WADE, Secretary,
Parliament Buildings, Toronto.

FINANCIAL STATEMENT.

RECEIPTS.

1897.		
Jan. 1.	Cash on hand.................	$5,184 55
Dec. 31.	431 yearly subscribers...	1,297 00
	106 new subscribers	318 00
	Registration fees	4,124 25
	Interest	187 29
	Herd books...................	41 25
		$11,152 34

EXPENDITURE.

1897.			
Dec. 31.	By Rent of hall and insurance		$63 50
	Printing and stationery..		252 59
	Postage		282 13
	Auditor, stenographer, and balance of commission for 1896		133 90
	Committees' expenses....		440 10
	Herd books, binding.....		128 00
	Herd books, Vol. XIII ..		1,237 34
	Prizes at different shows.		365 00
	Secretary's commission on 4,128 pedigrees.	$1,518 60	
	738 transfers....	73 80	
			1,580 60
	Cash		6,731 18
			$11,152 34

ASSETS AND LIABILITIES.

1897.				
Dec. 31.	To Cash			$6,731 18
	Office furniture, books, etc..			150 00
	Vol. I. D.H.B.,	94	copies.	141 00
	" II. "	287	"	430 50
	" III. "	388	"	582 00
	" IV. "	382	"	573 00
	" V. "	347	"	520 50
	" VI. "	350	"	525 00
	" VII. "	312	"	468 00
	" VIII "	289	"	433 50
	" IX. "	291	"	436 50
	" X. "	516	"	774 00
	" XI. "	668	"	1,002 00
	" XII. "	730	"	1,095 00
	" XIII. "	851	"	1,276 50
				$15,138 68

1896.		
Dec. 31.	By Balance..................	$15,138 68
		$15,138 68

I hereby certify that I have examined the books and accounts of the Dominion Short-Horn Breeders Association for the year ending December 31st, 1897, and that the above statement is in accordance with the same.

CHAS. F. COMPLIN,
Auditor.

TORONTO, January 26th, 1898.

The President, Mr. A. Johnston, said that before any motion was made to adopt the report, he wished to explain the circumstances under which representatives had been sent to the Maritime Provinces to advocate the Amalgamation of the Herd Books. He showed that there was a movement on foot in these provinces to organize a Cattle Breeders' Association, and to establish one Herd Book, in which, in their respective sections, all classes of live stock would be registered. This would mean that a growing plant and interest would be vested there which would come into competition and make confusion with our Herd Books already in use, and if not dealt with at once a concern would be established that would be costly to buy out should we desire to do so latter. In order to make thorough arrangements to come to a complete understanding personal interviews were necessary, and so the delegation was sent, for it was hopeless to come to any settlement through correspondence. Prompt personal action was necessary, and so we took the line of action we did. Mr. Hobson, our representative, is here, and will report.

Mr. John I. Hobson: I may say that the meetings were wholly satisfactory. It appeared to be the unanimous wish of the members of the Executive that I should go down to a meeting of the representatives from the different Maritime Provinces. The special object I had in view was to discuss this question of amalgamation, although, while I was there, I was asked to take part in other meetings, but that was only incidental. I may say I had private conversation with many stockmen there, and the more I thought over it and the more I heard the matter explained the more I understood the relative position of the associations of the east and our own Dominion Shorthorn Breeders' Associations, the more confirmed am I in my view of the matter, and the more confirmed am I that this is the proper time to close up that negotiation. I do not think for a moment that we should go to any extreme offer, but as long as they are prepared to meet us half way I think the Board will deal justly with them. I think that it is exceedingly desirous that this amalgamation should be brought about, providing we do not have to go down on our knees to do it. I think we ought to have one Herd Book for the whole Dominion.

Mr. F G. Bovyer of Prince Edward Island said: In the first place I will point out to you that the Maritime Provinces have very little interest in a direct way in dealing in stock with Ontario or further West. While occasionally we buy stock in the west, hardly any of our stock has ever gone west. Nova Scotia has a Herd Book in which they register in separate pages or a separate part of the Book different kinds of cattle, Shorthorns, Ayrshires, Holsteins and so on, but New Brunswick has a smaller Book. Both these books are managed by officials paid by the Provincial Government, one man for Nova Scotia and another man, for New Brunswick. These books are founded upon a principle quite objectionable to my mind, that is, they take on stock what you call four crosses from young cattle. Registered bulls are used for four generations and the fifth offspring can go on the Herd Book, and with that principle you would almost say they were grades, as it would be utterly impossible to follow up and say that breed is anything like true. I hear men living in certain parts of the country say, "That Ayrshire looks very good," so they fancy they can trace it back two or three generations, and go to work and get it on the book; and it being a Government affair politics have a lot to do with it. Of course, men with a little influence can get any sort of breed on the book, and that is the way affairs stand in Prince Edward Island, and I also think it is the case with the other two Provinces. In Prince Edward Island Mr. C. C. Gardiner worked up a Herd Book on precisely the same lines or rules, and I think nearly all the cows he has will record in and with the Dominion Herd Book, so the cattle in Prince Edward Island, the few we have there, are all ready to go on with. And besides that I have taken the trouble since I found I was requested to come up here, to write to all men interested in Shorthorns in Prince Edward Island, asking their opinion and all about the matter, and every one of them seems to think an amalgamation would be to the interests of all. We have a Government Stock farm where the principal Shorthorn cattle are bred, and I saw the Chairman of the Government Stock Farm's commission, and he is quite willing and intends to take advantage of any liberal offer the Dominion Shorthorn Herd Book people will make. I also had letters from the Secretary of Agriculture in Nova Scotia and Secretary of Agriculture in New Brunswick approving of the project, but these two Secretaries expressed the fear that a number of their cattle would not be eligible to go on, and additional expense would be a very severe obstacle in using the Dominion Book, and each of the Prince Edward Island gentleman whom I wrote all expressed the fear of expense. You will see all these men paid their fees and entered up their animals, and they thought these books were as perfect and as useful as anything got up, and while with them nothing is directly traced to importation they think it would be no object to get on the Dominion Book. But I think if you can offer really liberal terms, we could, (Mr. Archibald and myself) together with other friends of the movement down there, influence breeders of all the more valuable or pure bred cattle to get them on, and when once that was done then we could manage to cry down these spurious pedigrees.

Mr. WADE: What does it cost you now to register?

Mr. BOVYER: Fifty cents. New Brunswick agrees to publish a book for that fee. What I was going to suggest is, you offer us something almost equal or perhaps equal to copying all our pedigrees of the animals we could get our men to send in; that every man would become a member, and you take his pedigrees and copy them off into your book free for some short period—twelve months if possible, or something like that.

Mr. WADE then read the proposal made by the delegation to the Maritime Provinces, offering to record all animals, during a certain time, registered in the Maritime Province Books and eligible to register in the Dominion Book, free of charge.

Mr. C. C. ARCHIBALD, of Truro, N. S., said that Mr. Bovyer had pretty well covered the ground as regards the state of affairs in the Maritime Provinces, and he did not intend to make any speech. He was the one who first set the ball rolling to bring about an amalgamation, as he wanted to do away with the short pedigrees down in his country, and he wanted this Association to suggest some terms and they would try and agree to them. The greatest difficulty he had to contend with was these cheap bulls down in the east, with their short pedigrees. He wished to do away with the book down there and use the Dominion Book.

Mr. BOVYER: Do you think any considerable number of breeders in your Province would lay hold of the amalgamation scheme?

Mr. ARCHIBALD: I do not think we have many in Nova Scotia that are not recorded in the Dominion Book, and they would certainly want to bring about the amalgamation scheme.

Mr. BOVYER: I think the proposal of the delegation to the Maritime Provinces is about what I ask for.

Mr JOHNSTON: "I have had several letters from breeders down there, as well as conversations, and the general concensus of opinion is along the lines Mr. Bovyer has indicated, that is, we give them so many months, whatever is advisable, in which to transfer the animals that are eligible from their book to ours, and after that they be accepted on the same terms as we are at the present time. In fact, it is a very reasonable offer. I may say with regard to the matter there is no vested interest down there. Mr. C. O. Gardiner has a Record, his own private property. We approached Mr. Gardiner and told him we did not come to rob him of an interest or a plant, or rob any body of a business. Mr. Gardiner was just as free and frank as could be, and said "That is just the very thing I would like to see consumated; the matter in which you are here for, and so far as I myself am concerned you can sincerely count me in it." And with regard to Mr. Bovyer's statement that no Shorthorn will come from the east to the west, I may say I have gone with sheep to England, and have seen as many come back on the same ship from England, and I think there will be Shorthorns and many Shorthorns come from the east to the west.

Mr. MILLER took objection to the proposition, and suggested that their Association should register for the Maritime Province people all animals that were dead that had pedigrees, that were eligible to the Dominion book free of cost, and that they should pay for the registration of all the animals alive at the present time. He though if this

Association registered all dead animals free of cost to bring in animals they should not ask us to register living ones free of charge, because if they sent in an animal to register we would have to register all the ancestors to bring this animal in whether they were registered or unregistered in their book. He believed in being liberal, but he would hardly go so far as the suggestion made by this Association.

Mr. **Jas. Russell** concurred with Mr. Miller.

Mr. **Bovyer**: The matter is not so important to us, it is more a matter of policy to get the whole Dominion under one book. I am certain if you make the offer as liberal as you can it will then take us all our time canvassing, as the numbers are so few down there.

Mr. **Johnston**: Would it be possible to give us a rough estimate of the total number of cattle that would be entered in those books, as near as you can, I mean the living ones.

Mr. **Bovyer**: In Prince Edward Island on the Government Stock Farm I fancy they have some thirty-five head living, and take us farmers around, some of us have ten head, some six and so on. If you would gather up a hundred head I would be very much surprised.

Mr. **Archibald** said the only cattle he knew of in Nova Scotia that would be eligible for the Dominion Record and were not on, were four head.

Mr. **Johnston** differed from Messrs. Miller and Russell and said: The whole spirit of the times is a matter of not only Provincial intertrade but Imperial intertrade. I consider if we had attained to no object but the mere intercourse between these people it would benefit every man about this Board directly or indirectly, and the spirit of the times is to expand an intercolonial, inter-Imperial and foreign trade.

Mr. **Hobson**: I quite agree with the President when he said it is a matter of Dominion interest to have the amalgamation take place. I feel very strongly in this matter, and I do not think our President put it at all too strong. I was only down there a short time, but I had special opportunities of meeting a number, I might say, of the most prominent men, among them being Mr. Chipman, Robertson, the Government Superintendent, Col. Blair and many others, and I am confident as I am of standing on this floor that there is a movement started in the direction which is going to build up Shorthorn interests very much. I speak more particular from a Nova Scotia standpoint. I was struck with the idea, just as our President has voiced, that it is going to be a pretty large movement, and that before long they are going largely into this interest of breeding, and I think we ought to look to a little larger standpoint of merely what it may cost or or what it may not cost to register a few animals and other incidental expenses which have to be borne by this Association. But the point I wish to make is this: it is going to be of Dominion importance to amalgamate and perhaps of a great deal more importance than we now think it is

Mr. **C. M. Simmons** said when the Board met a year ago they had given the executive committee power to deal with all these matters, and he did not think they had exceeded their power when they sent this delegation to the Maritime Provinces. He also thought the proposition made by the delegation to the Maritime breeders was a fair one, and one which should be confirmed.

Mr. **Linton**: As one of the deputation I concur with the statements made. I think these gentlemen in the Maritime Provinces want to go in with us, and I think we can well afford, for the small number of pedigrees we have to record for nothing, to offer them an inducement of this kind. We want to build up one great Empire here, and we want to be one great country, so let us go on and help one another. Do not let us have sectional interests here and there and one pull against the other and destroy the very business we ought to build up. These men are going to be good customers in years to come, and perhaps they will be importing as they are nearer Britian than we are. Therefore, we will also want to buy from them, so let us be united people in this interest and we greatly benefit each other.

Mr. DAVIDSON : I do not think the committee went one step too far. I think the offer will be a mutual advantage to all authorities, and it would be easier settled to-day than ten years from now. It will also weed out all cattle that are not really eligible for our book, and I would be willing to move that we extend the proposition offered by our executive committee.

Mr. H. SMITH : I am decidedly in favor of carrying Mr. Davidson's motion, and I think the proposition is right, but, at the same time if we have no guarantee from their Governments, the very fact that the amalgamation is going to shut out a very large percentage will form the nucleus of a herd book which would be very likely carried on.

Mr. MILLER said he thought the representatives here had power to deal with the matter referred to by Mr. Smith. He also asked the representatives what they thought would be fair to get the Maritime Provinces to drop their books and what would be fair for this Association to do.

Mr. BOVYER thought the proposition as read by the secretary would induce them to give up their books and register in the Dominion.

Mr. HOBSON : The amalgamation of all interests of all Provinces will make us a much greater power when we come to deal with the Government. It has been proven that if we go before any of these bodies representing large interests we have a great deal of attention paid us and are more likely to carry our point. If we are all as one our power is very much greater.

It was then moved by John DAVIDSON, seconded by C. M. SIMMONS, "That this Association approves of the propositions made by the commission to the Maritime Provinces, offering to the breeders of Shorthorns of those Provinces, the right to register free of charge, during the term of twelve months all animals now registered in those books, that are required to record animals, and eligible for registration in ours." Carried.

Moved by H. SMITH, seconded by W. G. PETTIT, "That the penalty fees, so far as regards the cattle of the Maritime Provinces, be suspended during the same period as named in the former resolution." Carried.

Mr. BOVYER : On behalf of Mr. Archibald and myself and the Maritime Provinces generally, I thank you for your liberal offer.

A series of resolutions were drawn up to be confirmed at the annual meeting, and will be found in the minutes of said meeting.

The meeting then adjourned.

THE ANNUAL MEETING.

The twelfth annual meeting of the Dominion Shorthorn Breeders' Association was held in Shaftesbury Hall, Toronto, on February 25th, 1898, at 11 a.m.

The following members were present : Arthur Johnston, President, Greenwood ; Edward Jeffs, Bond Head ; H. Smith, Hay ; T. E. Robertson, Ilderton ; F. I. Patten, St. George ; Wm. Dawson, Victoria ; W. J. Biggins, Clinton ; David Rae, Fergus ; Jas. Tolton, Walkerton ; Wm. Linton, Aurora ; John Davidson, Ashburn ; Alex. Smith, Maple Lodge ; John Isaac, Markham ; W. G. Pettit, Freeman ; C. M. Simmons, Ivan ; Jas. Russell, Richmond Hill ; John I. Hobson, Guelph ; F. G. Bovyer, Georgetown, P. E. I. ; C. A. Archibald, Truro, N. S. ; Richard Gibson, Delaware, O. ; Robert Miller, Brougham ; Wm Brash, Ashburn ; J. C. Hanley, Read ; Peter Stewart, Atha ; J. J. Kitley, Dunkerron ; Dr. A. Smith, Toronto ; Geo. H. Johnston, Balsam ; Robert Oliver, Heron ; F. Green, Moose Jaw, Assa. ; J. C. Snell, London ; Daniel Dyer, Columbus ; Jas. Cook, Myrtle ; D. H. Rusnell, Stouffville ; H. J. Pearson, Meadowvale ; J. R. Pearson, Meadowvale ; W. D. Flatt, Hamilton ; Geo. Raikes, Barrie ; J. R. Snyder, Humber ; John Gardhouse, Highfield ; J. M. Gardhouse, Highfield ; W. W. Ballantyne, Stratford ; John Weld, London, and Henry Wade, Secretary.

Moved by F. I. PATTEN, M.D., seconded by ROBERT MILLER, that the minutes of the last annual meeting be taken as read. Carried.

The Secretary then read the minutes of the executive committee meetings during the year, which were confirmed.

The PRESIDENT then made a similar statement to that given at the directors' meeting regarding the proposed amalgamation of the Dominion and Maritime Provinces herd books.

The Secretary then read his Annual Report, which was also read before the meeting of Directors, and is given on preceding pages.

Moved by R. GIBSON, seconded by Dr. PATTEN, "That the report as read by the Secretary be received and adopted." Carried.

The Secretary then read a letter from Mr. C. W. Holmes, Secretary of the Maritime Stock Breeders' Association, Amherst, N. S., stating that at a meeting of their Association the following resolutions had been passed :

Moved by W. W. BLACK, Amherst, N. S., seconded by M. H. PARLEE, Sussex, N. B., "That we, the Maritime Breeders' Association, extend to the Dominion Shorthorn Breeders' Association, a vote of thanks to them and their delegate, Mr. John I. Hobson, for so able assistance, and that this may not be the only time that we may see him in this capacity, and we highly appreciate his services to us." Passed unanimously.

REPORT OF COMMITTEE.

Your committee appointed to consult with Mr. John I. Hobson, delegate from the Dominion Shorthorn Breeders' Association, conclude from statements received from him, that the best course for your Association to take is to appoint a committee of two to confer with the Dominion Shorthorn Breeders' Association at their next annual meeting, with instructions to make the best possible terms for the registration of Maritime Shorthorns in the Dominion Shorthorn herd book.

(Signed) W. W. BLACK,
F. G. BOVYER,
C. A. ARCHIBALD.

TRURO, December 29th, 1897.

Mr. C. A. Archibald, of Truro, N. S., and Mr. F. G. Bovyer, of Georgetown, P. E I. were the gentlemen appointed to represent this committee, and, at the meeting of the directors of the Dominion Shorthorn Breeders' Association and the two delegates from the Maritime Provinces, the following resolutions were drawn up to be submitted to this meeting.

Moved by JOHN DAVIDSON, seconded by C. M. SIMMONS, that this Association approves, of the proposition made by the Commission to the Maritime Provinces, offering to the breeders of Shorthorns of those Provinces, the right to register free of charge, during the term of twelve months, all animals now registered in those books, that are required to record animals, and eligible for registration in ours.

Moved by H. SMITH, seconded by W. G. PETTIT, that the penalty fees, so far as regards the cattle of the Maritime Provinces, be suspended during the same period as named in the former resolution.

President JOHNSTON : We give them this privilege because they have already paid for registration ; we do not want them to join us and pay a second time.

Moved by Captain T. E. ROBSON, seconded by R. GIBSON, "That the motion as read by the Secretary be confirmed by this annual meeting of the Shorthorn Breeders' Association." Carried.

Moved by ALEX. SMITH, seconded by C. M. SIMMONS, "That the rider motion just read be ratified by this meeting." Carried.

The meeting then adjourned until 2 p.m.

CORRESPONDENCE.

A communication was received from the Secretary of the Provincial Exhibition Commission, Halifax, N. S., thanking the Association for the special prize offered by the Association at the exhibition of 1897, and stating that they would be pleased to have a continuance of the same for the coming year.

Communications were read from the Hon. John Dryden, and Hon. Sydney Fisher, regretting their inability to be present.

A letter was then read from J. E. Powell, Secretary of the Shorthorn Society of England, expressing his pleasure in the upward tendency of the Shorthorn trade in Canada.

The PRESIDENT: Last night at a full Board meeting we agreed to contribute to the various shows the sum total of something like $800. We proposed to give $50 to Prince Edward Island, to be distributed as the executive see most in the interest of Shorthorns, $50 to Nova Scotia, $50 to New Brunswick, $150 to Manitoba, $50 to British Columbia, $50 to the Northwest Territories, and in Ontario $300 We decided to give prizes at Toroont, London, Ottawa and Quebec City, at any rate the Province of Quebec, wherever the Provincial Show should be held, and the whole aggregates somewhere in the neighborhood of $800. We thought you should be in full possession of this as well as all other matters relating to finances While it is impossible for you all to be at these meetings, we feel we wish to give you the fullest and freest explanation in order that we can have any expression on these matters or any other matter.

RESOLUTIONS.

Moved by WM DAWSON, seconded by D. RAE, "That those gentlemen who are life members of the Dominion Shorthorn Breeders' Association be made *ex-officio* directors of said Association." Carried.

Moved by H. SMITH, seconded by W. G. PETTIT, "That this Board of Directors would recommend to the members of the Association, convened at their annual meeting on the 9th of this month, the propriety of reducing the membership fees from $3 to $2, commencing with the Association year, 1st of January, 1898." Carried.

Moved by C. M. SIMMONS, seconded by W. J. BIGGINS, "That in the opinion of this Board of Directors, prizes awarded to the fair boards in the different Provinces, should be given or awarded to animals or herds owned by the residents of that Province." Carried.

Moved by C. M. SIMMONS, seconded by W. LINTON, that the sum of $50 be set aside for each of the Maritime Provinces and Quebec, and that it be left to the discretion of the Executive Committee as to how this be awarded. Carried.

Moved by C. M. SIMMONS, seconded by Dr. PATTEN, "That the sum of $150 be awarded to Shorthorns in the Province of Manitoba, and that it be left to the discretion of the Executive Committee as to how said prizes be awarded." Carried.

Moved by H. SMITH, seconded by EDWARD JEFFS, "That the sum of $50 be set apart to be distributed in prizes on behalf of Shorthorns for the Province of British Columbia." Carried.

Moved by W. G. PETTIT, seconded by EDWARD JEFFS, "That the question of prizes to Shorthorns in the Northwest Territories be left to the discretion of the Executive Committee to award an amount not to exceed $50. Carried.

Moved by WM. LINTON, seconded by D. RAE, "That the sum of $300 be set apart for awards to Shorthorns and Shorthorn grades at the various shows in Ontario, to be decided by the Executive Committee." Carried.

ELECTION OF OFFICERS.

Moved by Dr. PATTEN, seconded by Captain T. E. ROBSON, "That Mr. Jas. Russell, of Richmond Hill, be President for the ensuing year." Carried by acclamation.

The PRESIDENT elect, in a few well chosen words, thanked the members of the Association for the honor they had conferred upon him.

The election of the other officers was then proceeded with, and resulted as given on page 82.

SHORTHORN PROSPECTS.

BY RICHARD GIBSON, DELAWARE, ONT.

A trip of over 4,000 miles through the States of Illinois, Winconsin, Minnesota, Iowa, Nebraska, Colorado and Wyoming, has given me opportunities of meeting many of the most prominent stockmen of both the breeding and feeding grounds. The feeding States are Nebraska, Kansas, Iowa, Illinois, and Missouri; the breeding are those States where corn does not do well, and where cotton seed is not found. While the districts of breeding and feeding are becoming more clearly defined so are the breeds used and the system of management. The probabilities are that the breeder will confine his attention more to breeding proper, and not attempt to finish, while the feeder will keep almost entirely to finish off. They are in fact two quite dissimilar industries, and can be better carried on separately. For instance Nebraska and Missouri are fairly groaning under the weight of their corn crops, hence they become the feeding grounds.

Banks, railways and commission firms all combine to give cattle breeders opportunities that are unheard of in Canada. Both banks and commission firms will advance money to buy cattle, and sometimes the feed as well, if necessary; theyc harge 6% per annum interest for time in use. The railways give intending purchasers passes to purchase, and then a "feed in transit" rate.

For instance, I met Peter Hopley (well known to many of you) at Denver. He had a pass from Iowa. He wanted 1,000 steers, and as he did not find what he wanted in Denver he got a pass to Salt Lake City, Utah. Suppose he bought there, he would consign to Chicago, getting the benefit of the long haulage and with a "feed in transit" permit, he could unload at home and forward to Chicago when fat.

To show you the big scale upon which some of the operations are carried on, I met with a Mr. Rankin, Mo., who grew over 800,000 bush. corn last year, and is feeding 13,000 steers and 18,000 to 20,000 head of swine.

The Standard Cattle Co. is going out of breeding in Wyoming. This year they are feeding 11,000 head, 3,000 of which are under one roof. Another gentleman with whom I got acquainted is feeding 297,000 sheep, having four feeding yards in Nebraska and four in Kansas. These sheep are bred in New Mexico, Oregon, Idaho, Wyoming and Utah, the best however coming from Montana. I mention these to show the immensity of the work as carried on in the West, and to enable you to judge of the possibility of taking some part in the great work. There is not only a possibility but a great opening for a trade in thoroughbred bulls. Shorthorns and Herefords are decidedly in favor, while the blacks have no friends on the range. They refuse to herd with other cattle, and also have a fewer percentage of calves than other sorts. Their place is evidently by themselves, and within fences and they must not be asked to "feed thyself."

In Texas the Herefords have got a great hold, and on the high grade Shorthorn cow they are working wonders. Calves have sold this year for as much as $20 each. How much of this is due to the Shorthorn dam is not recorded. My opinion is that it is more than one-half at that age. In Utah, Montana, the West and N. W. States the Shorthorns are the favorites. Prices are improving and the demand increasing. One man modestly informed me that he only wanted 500 thoroughbred bulls this season, but would want more next.

Yearly I have tried to encourage you, and though my sanguine anticipations have not always been fulfilled, still the little rift in the clouds that I thought I saw last year has become bigger until the silver lining is indeed plain to see, and this year I bid you be of good heart, stick to your flocks and herds, the market has certainly sprung up. Thoroughly convinced since my return from the West am I that this is to be the thoroughbred centre for this continent that I have no hesitation in writing these words of encouragement. Why do I say this will be the centre? For several reasons. First the day of the eight year old ox is gone. I saw thousands of five and six year old on feed. If early maturity is desired it can only be accomplished by the use of bulls of the improved breeds. Again, we understand the art of breeding better than our neighbors. We are willing to do things in a small way, and we have the patience to attend to the little thousand and one trifles, apparently of slight consequence, but in reality they make the difference between failure and success.

While we are satisfied to sell a single bull our neighbors on the contrary want to sell by the car load, and while we are content to have a few of the best comfortably provided for they would have them covering a thousand acres. Then let us set our house in order looking for a better trade, let us not be covered with the mantle of conceit, and be satisfied with our past successes. Now that the quarantine is removed, fresh blood must be instilled into our herds. And with a fair wind the good old ship that has been springing leaks for the past eight years, will again round to and make port with the red, white and roan flag nailed to the mast head, and signals flying "Shorthorns and no surrender after a century's experience."

BROAD MINDED BREEDERS.

By William Linton, Aurora, Ont.

Some exhibitors no longer send their cattle to the shows with the object of ascertaining in a friendly way which is the best, and of learning from the awards of a mutually trusted judge wherein they may be improved. Animals are bought for exhibition and then sent the rounds of the fall shows as an advertisement of their owner's stock, or rather of his purse, and frequently end their guilded career at the shambles. Judges are not allowed to give effect to their own views, but are expected to follow instead of leading popular opinion, and undeserved criticism is often meted out to a man who has the courage of his convictions. Now it appears to me that much of this is caused by the keen partisanship of those who support different types, and look more to the advancement of their own sort than to the welfare of the breed in general. Shorthorn breeders of to-day have entrusted to them the accumulated skill and labour of generations, and in the possession of these several and varied types, each admirably adapted for its special purpose, the Shorthorn claims its superiority over every other breed of cattle. It is for breeders to maintain this superiority, not by jealously pushing forward their special type to the hurt of others, but by each endeavoring to maintain and develop the special qualities in which his type excels, which history plainly shows can only be done by steadfastness of purpose and consistent breeding from one type. Nature refuses to be hurried. An out-cross is no sovereign remedy for the difficulties which beset the breeder's path, as some appear to imagine. Both pure breeding and out crossing have in turn caught the popular fancy, but while fashion changes the laws of nature never do. Perseverance, constant care and close attention to individual merit and mating form the only road to lasting success.

It is ill for a country when the interests of one party are put before the national welfare, so whatever type we support let us remember we are all breeding Shorthorns.

BEEF BREEDS AND THEIR VALUE.

By John I. Hobson, Guelph, Ont.

The following paper was read at the Maritime Cattle Breeders' Association :

The fairly remunerative prices obtained of late years for dairy products as compared with the low prices for beef have caused a wonderful expansion of the dairy industry. Dairy herds have taken the place of animals of the beef breed all over the country, and even many long established breeders of pure breed cattle have felt compelled to follow the current fashion. The inevitable result is now beginning to take place. Beef has already appreciated in value, and those breeders of beef cattle who persistently held on the even tenor of their ways throughout the depression are now commencing to reap the fruits of their wisdom, while, as regards dairying, the prospects are that the output of cheese has come pretty well up to the demands of the consumer and that any great increase of it will result in prices too small to remunerate the dairyman for his trouble. The butter export trade, however, should show some expansion, but the increase of creameries all over the Dominion and the consequent greater production of butter will probably be an effectual bar to very satisfactory prices.

The prospects for beef, on the other hand, are excellent. Not only in Canada but in the United States there is a large shortage of cattle suitable for the export trade and for home consumption. In your Maritime Provinces, here, beef cattle are very hard to find, and your butchers have to go up to Ontario in order to supply your home market demands, while the big Chicago packing houses also make a profit out of you by shipping in their dressed beef by car-loads.

Surely such a state of things should be remedied, and that as quickly as possible. You have fine pasture lands and good facilities for raising and feeding stock, and when your home market is supplied you can send the surplus to the British markets, having this advantage over the Ontario and Chicago shippers that you are one thousand miles nearer those markets than the first named and fifteen hundred miles nearer than the American shippers. Furthermore, there are at the present time two representatives of American firms in this country looking for a central point at which to locate packing and dressed meat establishments with branches in different parts of the Dominion. If these establishments are located in Canada they will give a great impetus to the beef trade, and will create a steady demand for first-class beef cattle suitable for export to the British market. One great anxiety of these representatives is to know whether they can depend on a steady supply of cattle of a class they want. It behooves us to be prepared to supply all their wants.

The raising and feeding of beef cattle is attended with many advantages to the farmer. As compared with dairying, the work is easier while fully as remunerative. The breeder of pure breed beef cattle can net during the year quite as much, if not more, money from sales of his stock as the breeder of pure breed dairy cattle can, while the feeder, in spite of the fact that he has to wait somewhat longer than the dairyman for his returns, still finds them very satisfactory, if only he handles the right class of cattle.

And not only is the work easier but the feeder requires less help than the dairyman in his work, and therefore his wages account is smaller, a very important consideration in these days of small profits.

The feeder, too, can utilize his coarse grains to splendid advantage in feeding them to his stock. He is, thus, independent of the market fluctuations in value, and he has the satifaction of knowing that when his grain is sold in the form of live stock the price he will get per bushel will be a great deal more than he could have realized had he gone to the trouble and expense of cleaning, bagging and hauling it to the market.

But, it may be said, does not the dairy farmer utilize a good deal of his course grains in feeding his stock, and does he not get good returns therefrom in the sale of his milk?

That is correct and yet the feeder has a further advantage here, for by selling his products in the form of cattle he robs his farm of a minimum of fertility whereas the sale of milk removes from the farm some of the most valuable elements and the most costly to replace.

Then there is the important consideration of the large amount of manure obtained when many cattle are fed. This item is generally given various values when estimated by different authorities figuring on the amount of profit made in feeding lots of cattle, and reasonably so in some cases, because the food fed makes some difference to the value of the manure. But, in any case, if the manure is properly looked after it is a most valuable asset, for it is the cheapest fertilizer we can use to maintain the fertility of our farms, and we all know how important a matter that is.

Such, in brief, are a few of the advantages that accrue to the farmer who handles beef stock. Beef cattle have brought millions of dollars to feeders in Ontario, and now the great Northwest has definitely entered the ring as a shipper to Great Britain, besides supplying the home demand. What is being done by other Provinces can surely be just as well accomplished by you. If the Northwest cattle can be landed in Great Britain and make a profit after their rough knocking about on their long railroad journey to the coast, your cattle, escaping all this danger by going almost directly on board ship, should be landed in the British markets in the best condition possible and fetch the highest price.

The coming year will see a large immigration from the old country to our shores, the discoveries of gold and the Jubilee celebration having brought Canada into notice as a country well worth the attention of those with money for investment and those requiring homes for themselves. The home consumption of beef will largely increase, and the supply is not likely to catch up to the demand for some time to come. Now is the time to start into beef.

Before closing I will very shortly give a few characteristics of the principal beef breeds. First and foremost come the world-renowned Shorthorns, familiarly known as the red, white and roans. As beef cattle they are surpassed by none, while their records at the pail are also good enough to place them at the head of the list of general purpose cattle. In Great Britain many dairies keep only Shorthorn cattle, some of the cows being great milk producers. In Canada the tendency has been to breed Shorthorns more in the line of beef than of milk production ; but, nevertheless, we have some good milkers among the thoroughbreds, while grade Shorthorns are to be found all over the country that can fill the pail and raise a good calf as well. When an animal possessing Shorthorn blood can do this and also keep in fair condition, feeding up quickly when it has to be sent to the butcher, the breed to which such an animal belongs is certainly a useful one to keep. It is a loss of time to try to put flesh on dairy cattle that have been reared specially for dairy purposes, and not only a waste of time but of good food as well.

Shorthorns have proved of untold value in improving the beef cattle of this country, and will, probably, always be the largest factor in so doing. It is safe to say that out of every one hundred cattle marketed for beef ninety-nine, at least, are of more or less Shorthorn blood, a convincing argument as to the fitness of the breed for moulding the cattle of the country into a beef type. It is interesting in this connection to note that Mr. Henry Wade, in his history of Shorthorns, in the Dominion Shorthorn Herd Book, shows that to New Brunswick belongs the honor of being the first Province to introduce registered imported stock into Canada, and, in fact, to this continent. The importation consisted of four Shorthorn bulls which were recorded in the first Volume of the English Herd Book. They were purchased by the New Brunswick Board of Agriculture in 1825 or 1826, through the Speaker of the House of Assembly of that Province.

Next to Shorthorn come Herefords. The white faces have a well-earned reputation as grazers. They put on flesh rapidly on grass, and their beef is of a high order of merit. A cross between the Shorthorn and the Hereford generally results in an animal that will do well, obtaining, as it does, from the Shorthorn somewhat larger size and improved conformation, and from the Hereford the ability to do well. Its stall-feeding qualities will also be better. The Hereford cow, as a rule, is not a large milk producer, but raises her calf in good shape.

Sussex cattle have lately come more prominently before the public in England, but are very seldom to be found in Canada. They at one time bore a considerable resemblance to Devons, but are now being bred somewhat larger, and their beef is said to be of good quality.

Polled Angus are another beef breed that are not very numerously found in this country. In Scotland they play a considerable part in live stock husbandry, and a cross between them and the Shorthorn produces the famous Blue Grey Cattle which always fetch high prices on the Smithfield market.

Galloways and Highland cattle, like the Polled Angus, have not taken a deep root in this country. Like the latter their beef is good, but their smaller size is against them, and except, perhaps, in the colder parts of the great Northwest it is not probable that their numbers will ever largely increase.

At one time Devon cattle promised to become fairly numerous in this country, owing partly to their adaptability to the plow and farm work, but the advent of the Shorthorn eclipsed any attraction they might have had, and their numbers are now few and far between.

EXECUTIVE COMMITTEE MEETING.

A meeting of the Executive Committee of the Dominion Shorthorn Breeders' Association was held on March 24th, 1898.

Present : Jas. Russell, in the chair, and Messrs Linton, Miller, and the Secretary.

The subject of grants to exhibitions was taken up and the following amounts were allotted to the different shows :

ONTARIO.

$50 to Toronto Industrial. Herd of Shorthorns consisting of one bull and four females under two years of age, to be recorded in Dominion Shorthorn Herd Book, $30 ; Bull calf, to be dropped after February 1st, 1898, $10 ; Heifer calf, to be dropped after February 1st, 1898, $10.

$50 to London, Western Fair, (same as above).

$50 to Ottawa, (same as above).

$50 to Quebec (In case a Provincial show is held).

$150 to Fat Stock Show, Brantford. Steer list, milch cow list.

NOVA SCOTIA.

$50 to Halifax. To residents of the Province. Herd of Shorthorns consisting of one bull and four females, under two years of age, 1st prize, $20 ; second prize, $10. Also, in addition to regular prizes given by Halifax Exhibition Association, for best bull, $10 ; for best female, $10.

NEW BRUNSWICK.

$50 to St. John Exhibition, (same as for Nova Scotia).

PRINCE EDWARD ISLAND.

$50 to Charlottetown, (same as to Nova Scotia).

MANITOBA.

$100 to Winnipeg. To residents of the Province. Best herd of Shorthorn cattle, consisting of one bull and four females, all under two years of age, 1st prize, $40; 2nd prize, $20; Bull, any age, $20; Female, any age, $20. Also to be recorded in the Dominion Shorthorn Herd Book.

$50 to Brandon Central. Best herd under two years of age, consisting of one bull and four females, 1st prize, $20; 2nd prize, $10; best Bull, any age, $10; best Female, any age, $10. All to be recorded in the Dominion Shorthorn Herd Rook.

NORTH WEST TERRITORIES.

$50, (To be decided by committee).

BRITISH COLUMBIA.

$50, (No correspondence).

DOMINION AYRSHIRE BREEDERS' ASSOCIATION.

LIST OF MEMBERS FOR 1898.

Name.	Address.
Agar, Thos. G	Hollen.
Anderson, J	Crossland.
Anderson, J. A.	Hamilton.
Archibald, C. A	Truro, N. S.
Bass, W. M	Napanee.
Baldock, Wm	Mt. Charles.
Ballantyne, T. & Son	Stratford.
Blanchard, Thos. H.	Belleville.
Bogart, J. W.	Morewood.
Bonnell, C. E., M.D	Bobcaygeon.
Brooks, R. S	Brantford.
Black, F. S	Amherst, N. S.
Crawford Bros	Brown's Corners.
Caldwell Bros	Orchard.
Callander, Jas	North Gower.
Carruthers, J. B	Kingston.
Campbell, John R.	Vernon.
Central Experimental Farm.	Ottawa.
Clark, J. G	Ottawa.
Clark, Wm.	Meyersburg.
Corhran, J. S	Crystal City, Man.
Crosby, John	Campbelford.
Cummings, A. J	Heckston.
Cunningham, John	Norval.
Clow, John	Harrowsmith.
Davies, Robt	Toronto.
Douglas, John H	Warkworth.
Dundas & Grandy	Springville.
Dyment, N	Clappison's Corners.
Denyes, H. K.	Foxboro.
Eaglesham, Wm.	Fulton Mills.
Easton, Ed. H	Lyn.
Edwards, W. C. & Co	Rockland.
Empey, M. N	Napanee.
Eyre, H. E	Harlem.
Henay, Chas.	Campbellford.
Harrison, R	Avonroy.
Hume, Alex. & Co	Burnbrae.
Hodson, F. W	Toronto.
Humphries, Adam	Hastings.
Henry, Wm	City View.
Hurley, Denis	Vankleek Hill.
Hudson, Jos	Lyn.
Harper, Wm	Elbe Mills.
Harrison, R	Avonroy.
Inch, Frank	Kerwood.
James, J. A	Nilestown.
Johnston, F. K	Bickford.
Kains Bros	Byron.
Keeble, Geo	Brandon, Man.
Kennedy, John	Billings' Bridge.
Kinsey, Jos	Doon.
Klock, R. H. & Co	Klock's Mills.
Knight, Jonathan	Elginburg.
Laurie, John	Malvern.
Marsh & Sons	Gladstone.
Martin, John	Lucknow.
Melick, Aaron	Smithville.
Moote, Robt	Rosedene.
Murphy, R. G	Elgin.
Mackey Bros	Eburne, B.C.
McElroy, S. J	Bewdley.
McCormick, Jas	Rockton.
McKee, H. & J	Norwich.
Nichol, Walter	Plattsville.
Nott, Chas. A	Norwich.
Oliver, Adam	Motherwell.
Ontario Agricultural College	Guelph.
Philip, Thos	Woodbridge, N. Dak.
Rathbun Co	Deseronto.
Reid, R. & Co.	Hintonburg.
Ritchie, Jas	Lariviere, Man.
Robertson, Alex	Maitland.
Simpson, Alex	Campbellford.
Simpson, Jas	Brockville.
Smith, A. W	Simcoe.
Smith, J. C	Hintonburg.
Smith, W. M. & J. C	Fairfield Plains.
Sorby, D. & O.	Guelph.
Spear, Wm	Cobourg.
Steacey, R. G. & B. D	Lyn.
Steele, Bros	Glenboro, Man.
Stewart, Wm., jr	Menie.
Stirling, T. W	Kelowna, B. C.
Shaw, Jas	Drummond.
Sangster, R. R	Lancaster.
Taylor, F. W	Wellman's Corners.
Terrill, A	Wooler.
Thorn, Wm	Lynedoch.
Wells, A. C. & Son	Chilliwack, B. C.
Whalen, J. H	Westport.
Whittaker, H. J	N. Williamsburg.
Whitton, Jas	Wellman's Corners.
Williams, Thos. & Son	North Ridge.
Wood, And	Vankleek Hill.
Wooley, Alex	Springfield.
Walker, Thos	Hoard's Station.
Wooley, J. H	Simcoe.
Yates, Mahlon	Athens.
Yuill, Jos. & Son	Carleton Place.

DOMINION AYRSHIRE BREEDERS' ASSOCIATION.

ANNUAL MEETING.

The eleventh annual meeting of the Dominion Ayrshire Breeders' Association was held in the Albion Hotel, Toronto, on February 10th, 1898, at 2 p.m.

The following members were present: W. M. Smith, Fairfield Plains; Jas. McCormack, Rockton; J. C. Smith, Hintonburg; A. Kains, Byron; Jos. Yuill, Carleton Place; R. S. Brooks, Brantford; H. E Eyre, Harlem; W. M. Bass, Newboro; John Whalen, Westport; Wm. Baldock, Mount Charles; Wm. Spear, Cobourg; W.W. Ballantyne, Stratford; William Stewart, Jr., Menie; Alex. Hume & Co., Burnbrae; F. W. Hodson, Toronto; Crawford Bros., Brown's Corners; Caldwell Bros., Orchard; J. C. Snell, London; Wm. Weld, London; Robert Davies, Toronto; O. Sorby, Guelph; J. T. Guy, Bowmanville, and Henry Wade, Secretary-Treasurer.

Owing to the absence of the President, Mr. John Crosby, the first Vice-President Mr. W. M. Smith, occupied the chair.

Moved by Joseph Yuill, seconded by Jas. McCormack, that the minutes of the last annual meeting be taken as read. Carried.

Moved by F. W. Hodson seconded by Jas. McCormack, that the Secretary's report be adopted. Carried.

REPORT OF THE SECRETARY.

This Association has a remarkably good record for the past year.

Members. In 1896 we had fifty-one members, this year sixty-four, or thirteen more than last year. Received $192 by this means. I am quite sure that if the fee is lowered to $2 I will be able to increase the membership materially.

Registrations. We have registered 565 animals this year, besides making 150 transfers, taking in fees to the handsome sum of $619.45 against, in 1896, 445 registrations and $395 in fees. This is as it ought to be, and I hope this success will continue.

Herd Book. The third volume of the Dominion Ayrshire Herd Book has been printed and sent to all members who are entitled to it. It is a tidy volume of 387 pages, and cost the sum of $416.50.

Exhibitions. Ayrshire cattle were well brought out at all the shows, and were fairly represented at the Fat Stock Show held last fall in Brantford. A premium of $25 was given to the winner there by our Association, and it would be well to duplicate this prize this coming year. A list of prize winners will be prepared for the Government report.

Amalgamation. A communication has been received from the acting Secretary of the Ayrshire Importers and Breeders' Association of Canada, asking that a committee be appointed to discuss this subject. The committes could meet at Ottawa. In that case the subject of the appendix could very well be left over until after this discussion. The death of the late Secretary of that Association, Mr. S. C. Stevenson, is much to be deplored. As a manager of exhibitions, and a courteous and efficient Secretary of a contemporaneous Association, it will be hard to fill his place.

Office Work. This, of course, has been increased, and the Secretary has received $255.90 by commissions as per arrangement, as will be seen in the financial statement prepared again by an expert accountant. We started the year with $373.04, after paying ordinary expenses and for the third volume of the Herd Book, the handsome sum of $418.48 was left on the 31st of December last. Since our last meeting the quarantine regulations between ourselves and the good people of the United States have been done away with, and quite a number of animals have been purchased for the American market, but the bar on our Herd Book has not as yet been agreed upon.

We have also lost from amongst our members a very active one, who in lifetime, has served as full private, Director and President of this Association, and who, all his life, has been dealing in Ayrshire cattle and has been second to none in bringing this class of cattle to the front, viz., M. Thomas Guy, of Sydenham farm, Oshawa, during his lifetime an honorable and worthy gentleman.

HENRY WADE, Secretary.

FINANCIAL STATEMENT FOR THE YEAR ENDING DECEMBER 31ST, 1897.

Receipts.

1897.		
Jan. 1.	To balance on hand	$373 04
Dec. 31.	To registration fees	619 45
"	To membership fees, 64 members at $3.00	192 00
		$1,184 49

Expenditures.

1897.			
Dec. 31.	By postage		$ 30 16
"	" stationery		31 45
"	" telegrams, etc		2 00
"	" auditor for 1896		5 00
"	" printing Vol. 3, H. B.		416 50
"	" premium Fat Stock Show		25 00
"	" commisson on 672 pedigrees @ 35 cts	$235 20	
	207 dups. & trans. @ 10 cts	20 70	
			255 90
"	" balance carried forward		418 48
			$1,184 49

I hereby certify that I have examined the books and accounts of the Dominion Ayrshire Breeders' Association, and that the above statement is in accordance therewith.

CHAS. F. COMPLIN, Auditor.

Moved by Mr. Jos. YUILL, seconded by Mr. Jas. McCORMACK, That the secretary be instructed to draft a resolution of condolence on the death of the late Mr. Thomas Guy, one of the esteemed members of our Association, and one who did much to further the interests of the Ayrshire.

Mr. BALLANTYNE then suggested that the meeting next deal with the question of amalgamation and the Appendix, and before a discussion took place the following communications were read :

THE AYRSHIRE IMPORTERS AND BREEDERS' ASSOCIATION,
MONTREAL, Jan. 27th, 1898.

HENRY WADE, ESQ.,
Secretary Dominion Ayrshire Breeders' Association, Toronto, Ont.

DEAR SIR,—I beg to inform you that this Association would be ready to meet a Committee appointed by the Dominion Ayrshire Breeders' Association with a view of discussing the amalgamation between the two existing Associations.

Yours very truly,

J. P. L. BERUBE, Secretary.

Letters were also read from Steele Bros., of Glenboro, Man., Joseph Kinsey, Doon, and Thomas A. Blanchard, of Belleville, objecting to the doing away of the Appendix.

A communication was also read from J. E. Wood, Esq., Secretary of the Provincial Exhibition Commission of Halifax, N.S., asking that a special prize be offered by this Association for Ayrshires at their exhibition in 1898.

DISCUSSION ON AMALGAMATION.

W. W. Ballantyne : I have had correspondence with Mr. D. Drummond on the subject of amalgamation, and he says in the last letter I had from him that they had a meeting of their executive, and that they had then decided to ask our Association to send a committee to meet them. He said that most of them were in favor of amalgamation. I feel myself very strongly in the matter. I know when I became a member one of the first things I asked was, why should not we be amalgamated with the Quebec Association? Last fall, in a sale that we had made to the States, we were delayed about a month and a half in shipping the cattle on account of the pedigrees, and I understand that it was principally on account of the two herd books. They would really hardly recognize our herd books here, and if we had one good strong Association I do not see why it should not help us a great deal in sending cattle to the United States.

Jas. McCormack : I think Mr. Yuill and myself have had more to with that than other man except Mr. Wade. This is a matter that we tried one time before, and succeeded so far until this matter which we call the Appendix now came up. We wished to have a certain calf at that time classed in the herd book as imported stock, and they objected to have it or we would have finished the matter at Kingston. That is what burst the whole matter. They refused to endorse a resolution which we passed, and the consequence was we were left just as we were before. I think the whole difficulty with the American books is, they consider we should register in their herd book first. If we were willing to register in their herd book there would be little or no difficulty, and we are not very willing to do that. I do not think the two herd books have anything to do with it. So far as the amalgamation is concerned I think what I have just mentioned is the trouble we will meet with. I am quite satisfied to go on as before. I think the whole trouble comes by the arbitration which took place between us and them, as we recommended that certain expunged pedigrees were to be taken into the agreement—were to be accepted—and that is the very matter that broke up the amalgamation of the two herd books before at Kingston.

Jos. Yuill : I might just say I am very anxious we should have one herd book, and I have been talking to several Quebec men at Ottawa about amalgamation, and I think they are ready to go in if we can come to terms, and have no doubt that a committee from us to meet them would have the desired effect.

Mr. Wade : Of course, at the present time is a very favorable opportunity to approach them on account of the death of their former secretary. At the same time, nobody feels with greater sorrow the death of our late esteemed friend, Mr. Stevenson, than I do.

Wm. Stewart : I had a letter from Mr. Drummond, and they are willing, as Mr. Yuill says, to amalgamate on any reasonable terms. They will appoint a committee if we do the same. We will have to expect to give and take. The fact that our Appendix is going to be done away with, or at least is proposed to be done away with, may make the matter a little easier. It would certainly make us a very strong Association, and could be carried on a great deal more successfully.

H. E. Eyre in a few remarks explained to those present how that he had been on a committee at one time to meet the Quebec people with regard to amalgamating, and that they met in Kingston, from the Quebec Association, Mr. Rodden and other gentlemen; but on approaching them as to terms Mr Rodden wanted to have everything for the benefit of the Quebec people, as they said they would print the book in Quebec, as it would be much cheaper than the Ontario people could do it. Hon. Charles Drury then said that, as a representative of the interests of Ontario Government, he did not think the Government would agree to the proposition. At this the Quebec people said : "It is not your money we want ; we will do so and so," and Mr. Drury said they could do as they liked, but if the Ontario people found the cattle which they had been disputing over all right they would form another association and go on as before. The consequence was Mr. Rodden took his books and went home, and left them out in the cold. You will have to appoint a committee who are experts in pedigrees, and who are experts as business men, and who will not be taken short at any corner, and, at the same time, the book must be kept here, and then, after all these things are done, make up your mind to put up with what you get. As to having two books, I believe there is something in it. The people of the United States think we are not stable enough over here. When we sent Mr. Wade down to Montreal, the pedigree submitted by the Quebec people was decidedly wrong and false, while the pedigree submitted by Mr. Wade was the correct one; and in consequence of this and that we recommended it to be left in the book. But you know a decision of that kind destroys a book, and you cannot expect the people of the United States or any other place to accept pedigrees of that kind.

Mr. McCORMACK: In the old book if an animal had four crosses a pedigree was given.

Mr. YUILL: I think we agreed on a standard, but split on where the book was to be printed.

Mr. HODSON: I was down at their meeting, and Mr. Belton and Mr. Drummond say they are anxious to amalgamate, but there is a French element that will oppose it. Mr. Drummond suggested that the book be printed here and edited there. Mr. Hodson also said they would require to have someone down there to take registrations, etc.

Moved by J. C. SMITH, seconded by Jos. YUILL, that it is in the interest of this meeting to appoint a committee to wait on the Quebec Committee in regard to amalgamation

Moved by F. W. HODSON, seconded by H. E. EYRE, "That the committee to wait on the Quebec committee be composed of five gentlemen from this Association, including Mr. Wade, and they will have full power to act in the matter of amalgamation, and that the said committee be balloted for from the members present." Carried.

After the ballot the following gentlemen composed the committee: F. W. Hodson, Toronto; W. W. Ballantyne, Stratford; Jos. Yuill, Carleton Place; J. C. Smith, Hintonburg; Henry Wade, Toronto.

ELECTION OF OFFICERS.

The election of officers for the ensuing year resulted as follows:

President: W. M. SMITH, Fairfield Plains.

1st Vice-President: A. KAINS, Byron.

Vice-President for Ontario: J. C. SMITH, Hintonburg.

Vice-President for Quebec: W. C. EDWARDS, Rockland.

Vice-President for Manitoba: GEO. STEELE, Glenboro.

Vice-President for Assiniboine: CLAUDE H. MANNERS, Moosomin, Assa.

Vice-President for British Columbia: A. C. WELLS, Chilliwack, B. C.

Vice-President for Prince Edward Island: WILLIAM MILLAR, Marshfield, P E. I.

Vice-President for Nova Scotia: C. A. ARCHIBALD, Truro, N. S.

Vice-President for New Brunswick: M. H. PARLEE, Sussex, N. B.

A ballot was taken for the Directors for 1898 and the following is the result.

Directors: F. W. HODSON, Toronto; JOS. YUILL, Carleton Place; ALEX. HUME, Burnbrae; R S. BROOKS, Brantford; WM STEWART, JR., Menie; R. G. STEACY, Lyn; ROBERT DAVIES, Toronto; W. W. BALLANTYNE, Stratford; JAS. McCORMACK, Rockton.

Delegates to Industrial Exhibition: W. W. BALLANTYNE, Stratford; WM. STEWART, JR., Menie.

Delegates to Western Fair: A. KAINS, Byron; R. S. BROOKS, Brantford.

Delegates to Ottawa : J. C. SMITH, Hintonburg ; JOS. YUILL, Carleton Place.

Maritime Province Exhibitions : Moved by H. E EYRE, seconded by J. R CAMPBELL, that the Vice-Presidents for the different Maritime Provinces be the delegates to their Exhibitions. Carried.

Expert Judges Recommended: John H. Douglas, Warkworth; David Benning, Williamstown ; Alex. Hume, Burnbrae ; Wm. Stewart, Jr., Menie ; Jos. Yuill, Carleton Place ; J. C. Smith, Hintonburg ; Jas. Boden, Ste. Anne de Bellevue, Que ; Daniel Drummond, Montreal, Que ; A Kains, Byron ; John Crosby, Campbellford ; Robert Hunter, Lachine Rapids, Que ; R. Ness, Howick, Que.

Maratime Provinces : R. ROBERTSON, Nappan, N. S.

At this juncture the subject of doing away with the Ayrshire Appendix was discussed at length.

Mr. DAVIES moved and Mr. WM. STEWART, JR., seconded "That the Appendix to the Ayrshire Book be struck out entirely, and that after the 10th day of February, 1898, no more pedigrees be registered in the Appendix." Carried unanimously.

Mr F. G. BOVYER, from Georgetown, P. E. I., at this period of the meeting explained, that at the Annual Meeting of the Dominion Shorthorn Breeders' Association a resolution was adopted, offering the Breeders of the Maritime Provinces an inducement to amalgamate with the Dominion Association, and he hoped that a resolution would be passed at this meeting making some similar offer to the Ayrshire Breeders of the Maritime Provinces as had been made to the Shorhtorn Breeders, in order to bring about an amalgamation of the Maritime Province Herd Books with the Dominion Ayrshire Herd Book.

After a short discussion the following resolution was confirmed : Moved by JAS. McCORMACK, seconded by J. C. SMITH, "That this Association offers the Breeders of Ayrshires in the Maritime Provinces the right to register, free of charge, during the term of twelve months, all animals now registered in those books, that are required to record animals, and eligible for registration in ours." Carried

Moved by J. C. SMITH, seconded by WM STEWART, JR, "That the sum of $15 be given to each of the Provincial Exhibitions in the Maritime Provinces and also Manitoba Provincial Exhibition." Carried.

Moved by JAS. McCORMACK, seconded by WM. STEWART, JR., "That the sum granted to the Maritime Provinces and Manitoba be given as a first and second prize (1st $10, 2nd $5) to a young herd of a bull and three females not over two years of age, to be registered in the Dominion Ayrshire Herd Book and owned in the Province exhibited." Carried.

Moved by WM. STEWART JR., seconded by A. HUME, "That the sum of $10 be given to the Industrial Exhibitions, Ottawa and London, for bull calves under six months, registered in the Dominion Ayrshire Herd Book, providing these shows supplement the same amount" Carried.

Moved by F. W. HODSON, seconded by A. KAINS, "That $50 be voted to the Winter Dairy Show for Ayrshire cattle alone." Carried.

A paper was read by Mr J. C. Smith on "The Ayrshire and its Uses," also one by Mr. Jos Yuill, on "Care and Application of Manure." A vote of thanks was tendered these gentlemen for their able papers.

CARE AND APPLICATION OF MANURE.

BY JOSEPH YUILL, CARLETON PLACE, ONT.

Perhaps there is no branch of the farm industry in which there is so much loss as in the way the manure is handled.

What would we think of a man who would sell an acre of his farm every year. We would say that he would soon have his farm all sold, and both himself and his family would be on the road.

Still ninety-nine out of every hundred farmers in Ontario are just doing what we blame this improvident man for. We are selling our farms by the ton, by the bushel, or by the hundred weight, but we are selling it just as surely as would the man who sells an acre of his farm every year.

The principal fertile ingredients in our soils are nitrogen, phosphoric acid and potash. The market value of these three ingredients are: Nitrogen, seventeen cents per pound; phosphoric acid, seven cents, and potash is worth four cents per pound. Taking these at their market value, the man who sells 200 bushels of wheat at $1 per bushel, sells $48 of his farm. The man who sells $200 worth of hay at $12 per ton, sells $37 of his farm. The man who sells $200 worth of oats sells $33 of his farm.

We sometimes see farmers disposing of their coarse produce for less than its manurial value, and I often think if farmers knew the manurial value of the produce of the farm they would be a little more cautious in selling it. The manurial value of a ton of meadow hay is $5.10; timothy hay, $5 99; Hungarian hay, $6.10; red clover hay, $9.07; wheat straw, $2.69; barley straw, $3 32; oat straw, $3.06; cornstalks, $4.39; potatoes, $1.87, mangels, $1.19; sugar beets, $1.46; turnips, $1.02; carrots, $1.

The way we handle the manure on our farm—and of course we think it is the proper way or we would adopt some other system—is, we have a lean-to the full length of the building and twenty feet wide. The stables are cleaned out twice a day into this lean-to. The horse and cattle manure is mixed. The breeding sows are allowed to run in this yard; they root the manure over which prevents it heating. Manure should never be allowed to heat.

Prof. Saunders, of the Experimental Farm, Ottawa, conducted a test which showed that manure which had only been heated enough to kill the seeds of noxious weeds had lost forty per cent. of its manurial value. We do not allow it to remain in this lean-to more than three or four weeks when we haul it to the field and spread it on the surface. We make sure to have it all taken out clean with the last days of sleighing, and what is made after the snow goes away, and what is made while putting in the crop, is generally used on some hay or pasture fields near the buildings.

The man who sells $200 worth of cheese at ten cents per pound, sells $18 of his farm providing the whey is not brought back on to the farm; but if the whey is brought back on to the farm there is a manurial value of $3 in the whey, so that he only sells $15 with the milk that makes $200 worth of cheese. The man who sells $200 worth of beef at $5.50 per 100 lbs. sells $17 of his farm. The man who sells $200 worth of pork at $5.50 sells $13 of his farm. While the man who sells $200 worth of butter only sells 25 cents worth of his farm, and that 25 cents is only an allowance made for any buttermilk that may remain in the butter. So that the man who sells really good butter, or butter without any milk in it, or supplies cream to a creamery, which is the same thing, does not sell any of his farm.

I have not one word to say against artificial fertilizers, but I would advise the farmer to make sure and not allow one particle of solids or one drop of liquid manure to go to loss on the farm, and especially the liquid manure, which is more valuable than most farmers think it is. The liquid manure of a horse is worth three times as much as the solids. The liquid manure of the cow is worth twice as much as the solids. The liquid manure of the hog is worth once and a half as much as the solids. The liquid manure of the sheep is worth the same as the solids, and we all know how valuable sheep manure is.

We cut all our feed, and cut all our bedding, and we can spread manure on a hay field after the crop is in, and it will not rake up with the hay when the hay is cut.

Sometimes we use this manure for turnips. But if we have no field near the buildings requiring manure we make a pile of it away some distance from the buildings. We make the heap about four feet high and ten feet wide; build it square on the sides and ends and build up the sides and ends with clay, and cover it with about ten or twelve inches of clay. This will prevent it from heating and prevent the ammonia from escaping.

We spread this in autumn where the roots are to be the next year, and the clay we have on top and sides is just as good manure as any of the pile.

THE AYRSHIRE AND ITS USES.

By J. C. Smith, Hintonburg, Ont.

The Ayrshire is a native of Scotland, although bred very extensively in America. Their color is red and white. Some are spotted while others are nearly all red, which together with these spotted forms and well set horns, slim neck and heads, and large udders, makes them one of the most handsome breeds among the dairy classes. They are easy keepers, fine boned, and very active, which add much to their appearance. The Ayrshire are noted for the large flow of milk and the quality which they produce.

At the dairy test lately held in Brantford by the Fat Stock and Dairy Show, the average per cent. of butter fat in the milk of the Ayrshire was 4.10 per cent., the Jersey 4.67 per cent.; the Holstein 3 21 per cent. This shows that the Ayrshire is best adapted for milk and butter. Although the Jersey came ahead half a point, she did not give the quantity that the Ayrshire did.

The Ayrshires are the most profitable all around dairy cow on account of their large flow ot milk given when it is sold in the cities, and also when it is tested in the creameries and butter factories. They are easy milkers, and if handled when young can be made very quiet. The Ayrshire, when crossed with other good grade cattle, is, without exception, the ideal grade cow either for milk or beef. The first prize grade cow at the Dairy Show was Ayrshire grades. The Ayrshire, on account of their fair size and good color, are very desirable for beef. They have this advantage over the Holstein, as the butchers do not like the blue color, and they are ahead of the Jersey on account of the small size of the latter. The Ayrshire being easy keepers makes them very desirable for the farmer, as they are considered to give better results with proper care than any of the dairy breeds. The bulls are very quiet and easy to handle; their horns project above their heads and their glossy skins makes them very handsome in appearance.

On the way the calves are brought up depends greatly the future cow. The calves should have plenty of milk until they are five or six months old, together with plenty of hay and roots and a well bedded box stall. The dairy heifer should never be fed too heavily, so as to make her too fat, but she should be kept in a good thrifty condition. The dairy heifer should be bred when from sixteen to twenty months old, so as to be giving milk when a little over two years old. When bred too young they are stunted and never reach their natural size. If they are let go too long they never make as good milkers as those which have been giving milk younger. The bull calves also should be kept in a thrifty condition so as to make them strong and useful animals.

HEREFORD BREEDERS' ASSOCIATION.

REPORT OF THE SECRETARY-TREASURER.

I am glad to say that quite a better feeling as to prices has taken place, and a great many cattle have changed hands during the past year at remunerative figures.

EXHIBITIONS. At the Provincial Fat Stock Show held at Guelph last December some excellent beef animals were shown by Alfred Stone and the F. W. Stone estate. They competed against Polled Angus cattle, and in nearly every class came out first. At the Industrial Exhibition held last September in Toronto, Herefords were exhibited by selections from the Ingleside Herd of our President, Mr. H. D. Smith and from the herd of Alfred Stone of Guelph. Both these gentlemen made a creditable display of this breed and carried off all the premiums.

REGISTRATIONS. I have recorded 209 during the last year, 122 cows and 87 bulls, so we now have 742 pedigrees ready for our first volume; a few of the first ones also were sent us to copy out of the 1,114 destroyed. Our Herd Book should be better supported by Canadians.

MEMBERSHIP. Seven new members have joined this year; these, with the 14 who paid in 1896, make 21 members. Since the new assessment, as you will see by the statement below, we now have $217.14 on hand towards printing the first volume.

HENRY WADE, Sec.-Treas.

FINANCIAL STATEMENT.

Dr.		Cr.	
1896, Dec. 1st, To cash on hand..........	$147 22	1897, Dec. 1st, By cash commission......	$59 25
1897, " " " error	6	" " " " stationery........	9 85
" " " " " Reg. fees........	129 25	" " " " Postage	4 29
" " " " " member's fees....	14 00	" " " " Cash on hand........	217 14
	$290 53		$290 53

I hereby certify that I have examined the books of the Hereford Breeders' Association for the year ending November 30, 1897, and that the above statement is in accordance therewith.

CHAS. F. COMPLIN, Auditor.

Toronto, Ont., January 28, 1898.

The following was contained in a communication received from Mr. H. D. Smith, of Compton, Que.:

It has been the best year since I have had anything to do with Herefords. I could have sold five times the stock if I had had them. I have sold no calves under $100, and top price for bull calf $150, and for older bulls, $400, as for my 2 year bull, "Sir Horace." I notice in the Brantford price list that they ask for an additional entry fee from Herefords in order that they (Herefords) may be allowed the extra percentage offered to Hereford grades that compete successfully in class 4, and also for the $25 offered by Hereford Association. I do not know what the intention of the Hereford Association was in offering the prize, but mine was to induce Hereford breeders to exhibit, and not to have them contribute extra funds to the Fat Stock Show. I consider that Herefords winning in the ordinary classes are entitled to our specials without extra fees In class 5 a Hereford would now be obliged to make 3 entries, $4.50, to any other breeds $1.50 Both would already have paid $1·50 each in their respective class sections, so that a Hereford to compete in class 5 really pays 4 entry fees, $6.

HACKNEY HORSE SOCIETY.

The sixth annual meeting of the Hackney Horse Society was held at the Jockey Club Office, Toronto, at 3 p.m., on January 28th, 1898.

The following members were present: Robert Beith, M. P., Bowmanville, President; Robert Davies, Toronto; H. N. Crossley, Toronto; John Holderness, Toronto; John Macdonald, Toronto; Dr. A. Smith, Toronto; George Pepper, Toronto; A. G. Bowker, V .S., Woodstock; Robert Graham, Claremont; Robert Bond, Toronto, and H. Wade, Secretary-Treasurer.

Owing to the illness of the President, R. BEITH, M. P., Mr. H. N. CROSSLEY occupied the chair.

Moved by Mr. CROSSLEY, seconded by Mr. JOHN MACDONALD, that the minutes of the last annual meeting be adopted. Carried.

Mr. Wade then read his annual report, and it was moved by JOHN HOLDERNESS seconded by JOHN MACDONALD, that it be adopted. Carried.

REPORT OF THE SECRETARY.

I hereby present to you the sixth annual report of this Society, showing the transactions for the year ending December 31st, 1897.

I have also to regret the death of another of our prominent members, and an ex-director, Nicholas Awrey, ex-M. P. P., of Hamilton, since our last annual meeting. He was a very useful member to us.

REGISTRATIONS. We have recorded twenty-two Hackneys this year, just ten less than last year, when we had a great many registrations from Calgary. We have now 151 on record, besides the inspected mares, nearly enough for a small volume.

MEMBERS. Fourteen gentlemen have paid their fees for this year, just the same as in 1896.

HACKNEYS AT THE TORONTO INDUSTRIAL EXHIBITION.

Premiums awarded in 1897.

Section 1. Stallion four years old and upwards. 1st. Graham Bros., Claremont, Ont. Royal Standard (imp.)—55—(3918), bay, hind feet white, foaled in 1890, bred by B. H. Lane, Limavady, Ireland, imported by exhibitors; sire, Excelsior (198); dam, Royal Lady (379). 2nd. Robert Beith & Co., Bowmanville, Banquo—3—(162), dark bay, star on face, four white feet, foaled in June, 1892, bred by exhibitors: sire, Jubilee Chief (imp.)—1—(2122); dam, Mona's Queen (imp.)—4—(5887). 3rd. D. & O. Sorby, Guelph, Square Shot (imp.)—27—chestnut, foaled in 1889. Bred by Jas. Griggs, Liecester Square, Falkenham, Norfolk, Eng., imported by exhibitors; sire, Great Shot 2nd (1490); dam, Myrtle (256). 4th. Horace Crossley, Rosseau, Rosseau Performer (imp.)—34—(5391), chestnut, roan, foaled in 1893. Bred by John T. Browne, Doncaster, Yorkshire, Eng., imported by exhibitor; sire. Enthorpe Performer: dam, Fanny (111).

Section 2. Three years old. 1st. Hillhurst Farm, Hillhurst, Que. Danish Duke—bay, stripe on nose, hind ankles white, foaled in 1894. Bred by exhibitor; sire, Fordham (imp.)—36—(287), dam, Princess Dagmar (imp.)—10—(4590).

Section 3. Stallion 2 years old. 1st. D. & O. Sorby, Woodland's Performer—68—chestnut, white stripe on face, hind fetlocks white, foaled in June, 1896. Bred by M. H. Cochrane, Hillhurst, Que. ; sire, Barthorpe Performer (imp.)—52—(5097) ; dam, Miss Baker—16—(4371). 2nd. Robert Beith & Co., Bowmanville, Ont. Lorenzo—57—brown, star on forehead, foaled, May, 1896, bred by exhibitors ; sire, Banquo—3— ; dam, Lady Aberdeen (imp)—5—(5482). 3rd. Alex. G. Bowker, Woodstock. The Exile—61—chestnut, blaze on face, foaled, April, 1896. Bred by exhibitor ; sire, Coker's Nelson (imp.)—46— ; dam, Elsing Maid (imp.)—43—.

Section 5. Stallion any age. 1st. Graham Bros., Claremont. Royal Standard (imp.)—55—.

Section 6. Filly 3 years old. 1st. Horace Crossley, Rosseau, Ont. Rosseau Birdie—47—black, few white hairs on face, foaled, March, 1895. Bred by exhibitor ; sire, Fireworks (imp.)—16—(3602) ; dam, Lady Bird (imp.)—15—(5510). 2nd. Robert Beith & Co., Bowmanville, Ont. Mospa—40—bay, black points, foaled, May, 1895. Bred by exhibitors ; sire, Fireworks (imp.)—16—(3602) ; dam, Lady Aberdeen (imp. in dam)—5—(5482).

Section 8. Yearling Filly. 1st. Robert Beith & Co., Bowmanville, Ont. Blanco—76—chestnut, white star, one fore and two hind feet white, foaled, June, 1896. Bred by exhibitors ; sire, Seagull—8—(2261) ; dam, Cherry Ripe—70—(567).

Section 9. Breed Mare with foal of the same breed by her side. 1st. D. & O. Sorby, Guelph, Ont. Miss Baker—16—(4371), brown, white feet. foaled in 1889. Bred by Jas Case. Cockthorpe, Norfolk, Eng., imported by Hon. M. H. Cochrane, Hillhurst, Que. ; sire, Ruby (1342) ; dam, Betsey Baker (441). 2nd. Robert Beith & Co., Bowmanville, Ont. Mona's Queen (imp)—4—(5887), chestnut, star on face, fore feet and near hind foot white, foaled in 1889. Bred by W. Martin. Yorkshire, Eng , imported by R. Kerr, Reaburn, Man. ; sire, Lord Derwent 2nd. (1034), dam, Mayflower (imp.)—2—(767). 3rd. Horace Crossley, Rosseau, Ont. Lady Bird (imp.)—15—(5510), black, little white on face, near hind foot white, foaled in 1889. Bred by T. Watkinson, Yorkshire, Eng., imported by exhibitor ; sire, Superior (1410) ; dam, Jessie by Confidence (1265).

Section 10. Foal of 1897. 1st. Horace Crossley, Rosseau. Miss Roberta—78—dark bay, near hind foot and ankle white, star on forehead and snip on nose, foaled, April, 1898. Bred by exhibitor ; sire, Rosseau Performer (imp.)—34—(5391) ; dam, Lady Bird (imp.)—15—(5510). 2nd. Robert Beith & Co., Bowmanville, Ont. Hortenzio—69—bay, fore foot and both hind feet white, foaled, April. 1897. Bred by exhibitors ; sire, Jubilee Chief (imp)—1—(2122) ; dam, Mona's Queen (imp.)—4—(5887). 3rd. D. & O. Sorby, Guelph. Stella—74—dark bay, star on forehead, some white on off hind foot, foaled, June 5th, 1897. Bred by exhibitors ; sire, Square Shot (imp.)—27—(3294) ; dam, Miss Baker (imp.)—16—(4371).

Section II. Single Horse (mare or gelding), not more than fifteen and three-quarters hands. 1st. D. & O. Sorby. Woodlands, by Dash It All, out of Miss Baker (imp.)—16—(4371). 2nd. Horace N. Crossley. Althorpe Duchess (imp.)—21—(6358), bay, four black legs, foaled in 1892, bred by John T. Brown Doncaster, Eng., imported by exhibitor ; sire, Caxton (2398) ; dam, Bud in Hand.

Canadian Hackneys have not been shown this year at American shows, with the exception of the Hillhurst ones at Boston in the spring, and the Graham Bros. and R. Beith, M.P., at the Chicago Horse Show, where they were all victorious, and where Royal Standard also beat all the Coaching horses as well ; and if the Graham Bros. do not get the money they have the satisfaction of knowing that the horse was victorious.

FINANCIAL STATEMENT.

I beg leave, as Treasurer, to submit the following statement :

RECEIPTS.

1897.		
Jan. 1	Cash on hand	$132 10
Apr. 26	Geo. Pepper, for prizes	30 00
Dec. 31	Cash 14 members at $5.00	70 00
do	Registration fees, 22 pedigrees	44 00
		$276 10

EXPENDITURES.

1897.		
Apr. 26	By cash, Horse Show	$100 00
Sep. 9	do Industrial	25 00
Dec. 31	do Commission on twenty-two pedigrees	7 70
Dec. 31	Postage and telegrams	1 39
	Balance	133 86
		$276 16

ELECTION OF OFFICERS.

The election of officers for the ensuing year resulted as follows :

President : ROBERT BEITH, M.P., Bowmanville.

1st Vice-President : H. N. CROSSLEY, Rosseau and Toronto.

2nd Vice-President : JOHN McDONALD, Toronto.

Vice-Presidents for the Provinces : Ontario, A. G. RAMSAY, Hamilton ; Quebec, JAS. A. COCHRANE, Hillhurst, Que. ; Alberta, A. M. RAWLINSON, Calgary, Alta. ; Manitoba, A. J. MOORE, Swan Lake, Man. ; New Brunswick, J. R. FRINK, St. John, N. B.

Directors : ROBERT DAVIES, Toronto, ROBERT GRAHAM, Claremont, ROBERT MILLER, Brougham, ADAM BECK, London, ROBERT BOND, Toronto, ANDREW SMITH, V.S., Toronto, O. SORBY, Guelph, JOHN HOLDERNESS, Toronto, GEO. PEPPER, Toronto.

Secretary-Treasurer : HENRY WADE, Toronto.

Delegates to Industrial Exhibition : HENRY WADE, Toronto, JOHN MACDONALD, Toronto.

Delegates to Western Fair : ADAM BECK, London, A. G. BOWKER, Woodstock.

Delegate to Ottawa : JOHN HOLDERNESS, Toronto.

Delegate to Montreal : JAS. A. COCHRANE, Hillhurst, Que.

Delegates to Woodbridge Fair : JOHN MACDONALD, Toronto, JOHN HOLDERNESS, Toronto, ROBERT BOND, Toronto.

Delegates to the Horse Breeders' Association : ROBERT BEITH, M. P., Bowmanville, JOHN MACDONALD, Toronto.

Auditor : C. F. COMPLIN, London.

Judges : Moved by GEO. PEPPER, seconded by JOHN HOLDERNESS, that MR. A. B. McLAREN, of Aurora, Ill., U. S., be recommended as a judge of Hackneys at the Spring Horse Show and the Industrial in the fall. Carried.

CORRESPONDENCE.

The Secretary at this juncture read the following resolution, which had been adopted by the Illinois State Board of Agriculture condemning the Graham Bros. horse, Royal Standard : "Whereas, Graham Bros., of Claremont, Canada, did at the late Chicago Horse Show fraudently enter and show their horse "Royal Standard" in several classes from which to their knowledge he was positively debarred from being entered or shown, by the rules under which all entries were accepted, and

"Whereas, they suppressed such part of the pedigree of their horse as would have stamped him as a "half-blood," and a class being provided for grades, wherein this animal would have been eligible, and

"Whereas, this Board becoming apprised of the fraud immediately investigated the matter, and the proof being unanswerable, notice was at once sent to Graham Bros. that their horse "Royal Standard" was disqualified ; giving the reasons for the same and demanding the return of the Challenge Cup in their possession which was offered for the best stallion of any age, breed or size, and stating that all premiums won by them would be withheld until such return was made, and

"Whereas, they flatly refused to return the Cup, and have failed to meet the Board as they were invited to do, that they might have the opportunity to defend their action, therefore be it

Resolved, that the said Graham Bros. be and are hereby barred from participating as exhibitors or judges in any show held hereafter under the authority of the Illinois State Board of Agriculture, and that the Challenge Cup now in the hands of Graham Bros is hereby disqualified of all significance as an award at the Chicago Horse Show of 1897. That a Challenge Cup bearing a proper inscription be provided and forwarded to the rightful winner. That all the premium money diverted by the disqualified aforesaid "Royal Standard" be paid to the parties to whom it belongs—to the end that the honor and integrity of this Board in all its dealings with exhibitors to be demonstrated and preserved."

After the resolution of the Illinois State Board was discussed, and after a short debate, it was moved by ROBERT DAVIES, seconded by JOHN MACDONALD, and carried :

"Whereas we, the members of the Hackney Horse Breeders' Association of Canada, in meeting assembled, have had brought under our notice a resolution passed by the Illinois State Board of Agriculture regarding the conduct of the Messrs. Graham Bros., of Claremont, Ont., in entering their horse Royal Standard in the Hackney classes of the horse show held in the Coliseum Building at Chicago from November 1st to November 6th, 1897, inclusive ;

"Whereas we have reason to believe from the explicit statement made before us this day by Mr. Robert Graham, of the firm of Graham Bros., Claremont, Ont., that the facts are as set forth, namely : that the firm had no intention of entering at the said show in Chicago until they were approached by an agent thereof ; That they assured the agent that under the printed heading of the class the horse Royal Standard was ineligible ; That the agent requested to be shown the certificate of entry in the English Hackney Stud Book ; That this same certificate was forwarded to the agent and he showed it to the duly appointed manager of the show ; That the certificate was returned with the information that instead of horses being required to be registered in the American Hackney Stud Book, as stated in the prize-list, they were eligible if entered in any recognized Hackney Stud Book, and that the conditions in the catalogue so read ; and that with this detailed information came an assurance that Royal Standard was eligible and that his entry would be accepted ;

"Therefore be it resolved that we desire to express our utmost sympathy with the Messrs. Graham, of Claremont, Ont., and to assure them that we are satisfied they have been grossly wronged and slandered by the said State Board of Agriculture of Illinois ; that our confidence in their integrity is undiminished ; that their conduct in our opinion has been straight forward and above suspicion throughout and that at all times we shall be prepared to give them such support as lies within our power to establish the honesty of their intentions in their dealings with the executive of the recent horse show at Chicago.

"It is also resolved that in our opinion, formed on evidence submitted to us this day, the charges of fraud, of suppression of particulars as to breeding, of 'ringing', and of dishonorable conduct made in the resolution adopted by the State Board of Agriculture of Illinois, are entirely unwarranted, and, being such, are slanderous, libellous and unworthy the said board.

"It is hereby further resolved that the Secretary of the Hackney Breeders' Association of Canada be instructed to have copies of the foregoing resolutions of this Association struck off and forwarded to the State Board of Agriculture of Illinois, one to each member thereof, to the known Hackney breeders throughout Canada and the United States, and to the local papers and to the Associated Press."

The following letter was read :

OFFICE OF THE AMERICAN HORSE SOCIETY,
NEW YORK, JAN. 25th, 1898.

DEAR SIR,—At the last meeting of the Board of Directors of this Society, there was submitted a letter from Mr. Jas. A. Cochrane, in which he suggested that the Western Hackney Association, the Canadian Hackney Association and the American Hackney

Society amalgamate, and after the reading of the same the board of this Society directed the Secretary to write to these Associations for particulars and full information, and to submit their replies at the next meeting.

I therefore write asking if you will kindly furnish me with a copy of your by-laws and constitution, a list of members, a copy of conditions of entry, a copy of your stud book, if any has been published, and such other information as you may be able to furnish, and greatly oblige.

Very truly yours,

(Sgd.) W. S. WEBB, Sec.-Treas.

No action was taken on the letter from the Secretary of the American Hackney Society as it was the unanimous feeling of the members present that an amalgamation would not be beneficial.

OFFER OF SILVER MEDALS.

The Secretary read the following offer from the Hackney Horse Society of Great Britain :

SIR,—I have to inform you that the Council of this Society has adopted the following scheme for the offer of Silver Medals to Affiliated Societies :

A. (1) For the best Hackney or Pony Mare, Filly or Filly Foal registered in the English Hackney Stud Book or entered for the subsequent Volume ; or (2) For the best Hackney or Pony Mare, Filly, or Filly Foal by an imported sire and out of an imported dam, both registered in the English Hackney Stud Book.

N. B.—No restrictions as to prizes or classes are connected with this scheme, and the Medal will be awarded to the best Hackney or Pony Mare, Filly, or Filly Foal exhibited, in accordance with the above.

Where not less than £25 are offered in Classes for Hackney Stallions, Entire Colts or Colt Foals, the Council will give a Second Silver Medal.

B. (1) For the best Hackney Stallion, Entire Colt, or Colt Foal registered in the English Hackney Stud Book or entered for the subsequent Volume ; or (2) For the best Hackney or Pony Stallion, Entire Colt or Colt Foal by an imported sire and out of an imported dam, both registered in the English Hackney Stud Book.

No animal can take more than one Medal during any one year.

In the event of any dispute as to the interpretation of these Rules the Council of the Hackney Horse Society reserves full power of decision.

Should your Society decide to co operate in the foregoing scheme, it is desired that application be made on the form attached.

HENRY F. EUREN, Secretary.

NOTE.—Affiliated Societies pay an Annual Subscription of One Guinea, and receive a Silver Medal or Medals, a free Copy of the Stud Book annually (for the use of Members and for preparation o Catalogue), and all printed matter relating to the Society's work, as published.

Moved and seconded that clause " B " be adopted for the Spring Horse Show, and clause " A " for the Industrial Exhibition.

CLYDESDALE HORSE BREEDERS' ASSOCIATION.

ANNUAL MEETING.

The twelfth annual meeting convened in the Albion Hotel, Toronto, on Tuesday, the 8th of February, 1898, at 2 p.m.

The following members were present: J. M. Gardhouse, Highfield; John Gardhouse, Highfield; H. N. Crossley, Toronto; Jas. Hunter, Alma; J. Henderson, Belton; John Vipond, Brooklin; O Sorby, Guelph; F. G. Bovyer, Georgetown, P.E.I.; J. G. Snell, London; A. Doherty, Ellesmere; A. Innes, Clinton; H. Wade, Secretary, Toronto.

The Secretary read his annual report, and it was moved by JOHN VIPOND, seconded by O. SORBY, that the minutes of the last annual meeting be taken as read and that the report be adopted. Carried.

In the absence of the President, Mr. ROBERT DAVIES, it was moved by H. N. CROSSLEY, seconded by J. HENDERSON, that Mr. J O. SNELL take the chair *pro tem.* Carried.

Mr. J. C. SNELL then read the following address, which had been sent in by the President.

LIST OF MEMBERS FOR 1898.

Name.	Address.
Agur, Amos	Nashville.
Balsdon, John I	Balsam.
Bell, John	Amber.
Beith, Robt	Bowmanville.
Brady, Thos	Chatham.
Byerly & Reid	Cook's Creek, Man.
Charlton, E. W. & D	Duncrief.
Christie, Peter	Manchester.
Clark, J. G.	Ottawa.
Clarke, C. E	St. Cloud, Minn., U.S.
Clayton, Geo	Peepabun.
Cockburn, Geo	Baltimore.
Crossley, H. N	Rosseau.
Davies, Robert	Toronto.
Davidson, Jas. I	Balsam.
Davidson, Jas. B	Ashburn.
Davidson, John	Ashburn.
Doherty, Alex	Ellesmere.
Dundas & Grandy	Springville.
Edwards, W. C. & Co	Rockland.
Gordon, G. D	Ernest, N. Dak., U.S.
Good, Thos	Richmond.
Graham, Robt	Claremont.
Gregg, G. D	Seneca, Kan., U.S.
Hendrie, Wm. & Co	Hamilton.
Heron, Robt	Ashburn.
Hodgkinson, J. C	Beaverton.
Klock & Co	Klock's Mills.
Martin, Chas	Ashdown.
Moffatt, John G	Pilot Mound, Man.
Moffatt, W. G	Teeswater.
Miller, Robt	Brougham.
Mutch, A. & G.	Cotton Wood, N.W.T
Mustard, Wm	Seeburn, Man.
McBeth, Donald	Oak Lake, Man.
Macfarlane, Jas	Baljennie, Sask.
McLean, Sol	Franklin.
McKay Milling Co	Ottawa.
Neilly, Wm	Gilford.
Robinson, Thos. W	High River, Alta.
Ross, Jas	Inverhaugh.
Shedden Cartage Co	Montreal, Que.
Smith, John E	Brandon, Man.
Smith, W. T	Glenboro', Man.
Sorby, D. & O	Guelph.
Sorby, O	Guelph.
Stewart, Peter	Parkhill.
Symmes, J. W. & E	Aylmer, Que.
Taylor, Thos	Harwich.
Vipond, John	Brooklin.
Watt, J. & W. B	Salem.
White, A. G	Pembroke.

PRESIDENT'S ADDRESS.

By R. Davies, Toronto.

I am very sorry that other duties of pressing importance prevent me from presiding this afternoon. As regards Clydesdale horses, there has been quite a movement in their sales during the last year, both with pure bred Clydesdales and their progeny, as there is a great demand for draught horses at the present time.

I have glanced over the Secretary's report, and find that the registrations of 1897 are equal to those of 1896, but that the membership has materially fallen oft. I also note that the Secretary recommends that the annual fee be reduced from $3 to $2, so that the membership will be greatly increased ; and I also agree with him that a circular should be prepared asking Clydesdale men to send in all the registrations they can before the first of July next in order to have sufficient pedigrees to have the 9th volume printed.

I have had a communication from David McCrae, and I understand he has also written the Secretary on the subject of amalgamation, and asks that a committee be appointed at this meeting to confer with a committee appointed by the American Clydesdale Association, on which question I would like to have the feeling of the meeting, as it should be well considered before any action be taken in the matter.

REPORT OF THE SECRETARY.

I beg leave to present to you the twelfth annual report of this Association, giving a synopsis of the business transacted during the last year.

Registrations. We have recorded ninety-nine Clydesdales this year, and have made thirteen transfers, just one short of last year. This is gratifying.

Members. The depression in horse breeding, and the indifference shown by breeders in recording their stock, still continues, and, as with other horse associations, our revenue, especially in members' fees, has fallen off materially ; only twenty-nine have paid this year against forty last year, but if the members' fees are reduced to $2 per annum, it would help us greatly.

Amalgamation. Some of our members, I am sorry to say, think that an amalgamation with the American Association would be a benefit to us in Canada, and are persistently bringing it up at the meetings of the American Association. Where the benefits are to be derived eventually I do not see ; still, as it is asked that we re-appoint a committee to act in this matter, it should be done, but they should weigh carefully what benefits are to be derived from it. The pecuniary part is not to be thought of in an important matter of this sort. It only costs $1 to record an animal in our book.

Shows. A list will be prepared of the prizes taken by Clydesdales for the Government report. Clydesdale horses were very successful at the late horse show held in Chicago.

Stud Book. Volume VIII, the last one published, contained in all 495 pedigrees ; we have now on hand 386 for the ninth volume. If a circular was sent out stating that the ninth volume would be closed by the 1st of July, we would easily get another 100, which would make the volume as large as volume eight. I strongly urge this step, as our finances by that time would allow the expenditure.

Henry Wade, Secretary.

FINANCIAL STATEMENT.

Receipts.

1897.		
Jan.	To balance on hand	$ 92 67
	To 29 membership fees @ $3 each	87 00
	To registration fees (99 pedigrees, 13 transfers)	123 50
		$303 17

Expenditure.

1897.			
Dec. 31st.	By commission, 99 registrations @ 35 cts	$34 65	
	13 trans @ 15 cts	1 95	
			$ 36 60
	Postage and stationery		24 00
	Insurance on stud books		15 00
	Special premium Canadian Horse Show		80 00
	Balance on hand		147 57
			$303 17

Assets.

Cash on hand	$ 147 57
2,220 unbound vols. at $1.00	2,220 00
	$2,367 57

ELECTION OF OFFICERS.

The election of officers resulted as follows :

President : Robert Davies, Toronto.

First Vice-President : Robert Graham, Claremont.

Vice-President for Ontario : Douglas Sorby, Guelph.

Vice-President for Quebec : Robert Ness, Howick, Que.

Vice-President for Nova Scotia : Col. Blair.

Vice-President for New Brunswick : A. S. Murray, Fredericton.

Vice-President for P. E. Island : W. P. Balderson, North Wiltshire.

Vice-President for Manitoba : J. E. Smith, Brandon.

Vice-Presidents for Northwest Territories : John A Turner, Calgarry, Alta ; J. M. McFarlane, Saskatchewan.

Directors : Robert Beith, M. P., Bowmanville ; John Davidson, Ashburn ; Geo. Cockburn, Baltimore ; Robert Miller, Brougham ; John Vipond, Brooklin ; Geo. Clayton, Peepabun ; Alex Doherty, Ellesmere.

Delegates to Industrial Exhibition : John Davidson, Ashburn ; O. Sorby, Guelph.

Western Fair : A. Innes, Clinton ; J. Henderson, Belton.

Ottawa Exhibition : J. G. Clark, Ottawa ; Robert Beith, M. P., Bowmanville.

Montreal Exhibition : R. Ness, Howick, Que.

Delegates to Horse Breeders' Association—Robert Miller, Brougham ; Robert Davies, Toronto.

Judges Suggested for Exhibition—Joseph Hall, Arkona ; J. M. Gardhouse, Highfield ; John Vipond, Brooklin ; Jas. Evans, St. Marys ; Peter Christie, Manchester C. C. Gardiner, Charlottetown, P. E. I.

Auditor—F. C. Complin, London.

The suggestion of the Secretary in his Report, *re* reduction of membership fees, was then dealt with, and without any discussion it was,

Moved by J. HENDERSON, seconded by O. SORBY, "That the Secretary's recommendation, that the membership fee be reduced from $3 to $2, be adopted." Carried.

A general discussion then took place on the subject of amalgamation.

Moved by JOHN VIPOND, seconded by O. SORBY, "That the matter of appointing a Committee from this Association to meet a Committee from the American Clydesdale Association to discuss amalgamation be laid over for further consideration." Carried.

The subject of printing the 9th Volume was then referred to, and it was moved by ROBERT GRAHAM, seconded by O. SORBY, "That the Secretary be instructed to send out circulars asking the Breeders to send in all the registrations they can before the 1st of July in order to get sufficient pedigrees to print the 9th Volume." Carried.

The meeting then adjourned.

CLYDESDALES AT THE TORONTO INDUSTRIAL EXHIBITION.

The premiums won by Clydesdales at the Industrial Exhibition, Toronto, August 30th to September 11th, 1897, are as follows:

STALLION AND FOUR OF HIS PROGENY, THE PROGENY NOT TO BE OVER TWO YEARS OLD.

1ts. The Royal Standard (imp.) [2220] (10014); brown, white on face, hind legs white; foaled May, 1892. Bred by W. Robertson, Elgin, Scotland; imported by Graham Bros., Claremont; sire, Royalist (6242); dam, Betsinda (10150). Exhibitor, Beaverton Horse Breeding Co., Beaverton, Ont.

2nd. Grandeur (imp.) [1724] (6814); brown, spot on forehead, one hind foot white; foaled in 1887. Bred by W. Hunter, Strawraer, Scotland; imported by exhibitors; sire, Darnley (222); dam, Trim of Garthland (4699). Exhibitors, D. & O. Sorby, Guelph.

STALLION, FOUR YEARS OLD AND UPWARDS.

1st. Grandeur (imp.) [1724] (6814). Exhibitors D. & O. Sorby, Guelph.

2nd. Prince of Quality [2173] 5648; black, ratch on face, hind legs white; foaled in 1889. Bred by R. Holloway, Alexis, Ill.; sire, Cedric (imp.) 929 (1087); dam, Jeanie Roy (imp.) 2245. Exhibitor, Robert Davies, Toronto.

3rd. Lord Charming [2264] 7564; bay, ratch on face, left fore and hind legs white; foaled May 29th, 1893. Bred by Robert Holloway, Alexis, Ill.; sire, Prince Charming [2263] 5647; dam, St. Cuthbert's Lady [2303] 3426. Exhibitor, Robert Davies, Toronto.

4th. Craichmore Darnley (imp.) [2127] (5667); bay, white face, four white legs; foaled April, 1886. Bred by Wm. McMaster, Scotland; imported by exhibitor; sire, Darnley (222); dam, Flora (843). Exhibitor, T. W. Evans, Yelverton.

STALLION, THREE YEARS OLD

1st. Young Macqueen [2290]; bay, four white feet and stripe on face; foaled in 1894. Bred by R. B. Ogilvie, Madison, Wis.; sire, Macqueen (imp.) [462] (5200); dam, Belle of the Lyons (imp.) [2325] 3511. Exhibitors, Graham Bros., Claremont.

2nd. King's Own [2172]; brown, off hind foot white; foaled May, 1896. Bred by exhibitor; sire, Queen's Own (imp.) [1708] (7176); dam, Candour (imp.) [1656]. Exhibitor, Robert Davies, Toronto

3rd. Warlock 8053; sire, Second Chooser; dam, Lady Superior. Exhibitors, Hunt & Colter, Brantford.

4th. Macqueen [2218]; dark bay, ratch on face, hind heels white; foaled in 1894. Bred by exhibitor; sire Queen's Own (imp.) [1708] 7265 (7176); dam, Miss Fleming [1919]. Exhibitor, A. Doherty, Ellesmere

STALLION, TWO YEARS OLD

1st. Border Riever (imp.) [2307]; brown, star on face, near fore foot, off hind leg and near hind foot white foaled May, 1895. Bred by Lord Polworth, St. Boswell's, Scotland; imported by exhibitor; sire, Prince of Millfield (9650); dam, Connie Nairn (11569). Exhibitor, Robert Davies, Toronto.

2nd. Goldfinder II. [2289]; brown, face and hind legs white; foaled in 1894. Bred by Wm. Kerr, Houston, Scotland: imported by Innes & Horton, Clinton, Ont.; sire, Goldfinder (6807); dam, Stylish Lady, by Eastfield Style (6742). Exhibitor, James Henderson, Belton.

3rd. Black Prince [2240]; black, foaled May, 1895. Bred by exhibitor; sire, Queen's Own (imp.) [1708] (7176); dam, Candour (imp) [1656]. Exhibitor, Robert Davies, Toronto.

4th. Baron's Pride [2305]; bay, stripe on face, hind feet white; foaled July, 1894. Bred by exhibitors; sire, Queen' Own (imp.) [1708] 7266 (7176); dam, Flora Temple [2343]. Exhibitors, Graham Bros., Claremont.

YEARLING COLT, ENTIRE.

1st. Ophelia's Boy (imp.) [2309]; brown, stripe on face, hind legs white; foaled May, 1896. Bred by Stephen Hunter, Stramaer, Scotland; imported by exhibitor; sire, Macgregor (1487); dam, Ophelia (12508). Exhibitor, Robert Davies, Toronto.

2nd. Olivette's Lad (imp) [2309]; brown, stripe on face, hind legs white; foaled May, 1896. Bred by Stephen Hunter, Strawraer, Scotland; imported by exhibitor; sire, Macgregor (1487); dam, Ophelia (12797). Exhibitor, Robert Davies, Toronto.

3rd. Boydston Yet [2247]; bay, small star on forehead; foaled March, 1896. Bred by exhibitor; sire Tofty (imp.) [2123] (9452); dam, Boydston Lass [1920]. Exhibitors, Jas. I. Davidson & Son, Balsam.

STALLION, ANY AGE.

1st. Young Macqueen [2290]. Exhibitors, Graham Bros., Claremont.

FILLY, THREE YEARS OLD.

1st. Boydston Lass 7th [2286]; bay, ratch on face, four white feet; foaled June, 1894. Bred by exhibitors; sire, Westfield Stamp (imp.) [1819] (9167); dam, Boydston Lass 3rd [1927]. Exhibitors, Jas. I. Davidson & Son, Balsam.

2nd. Corinne [2226]; bay, white stripe on face, hind legs white; foaled July, 1894. Bred by exhibitors; sire, Queen's Own (imp.) [1708] 7266 (7176); dam, Queen Mary (imp.) [2225] 3000. Exhibitors, Graham Bros., Claremont.

3rd. Queen Bell [2193]; bay, white face, three legs white; foaled May, 1894. Bred by exhibitor; sire, Queen's Own (imp.) [1708] 7266 (7176); dam, Barr Bell (imp.) [1324]. Exhibitor, Robert Davies, Toronto

FILLY, TWO YEARS OLD.

1st. Starlight [2278] 8301; bay, stripe on face, hind feet white; foaled in 1895. Bred by exhibitors; sire, Grandeur (imp.) [1724] (6814); dam, Evening Star (imp.) [994. Exhibitors, D. & O. Sorby, Guelph.

2nd. MacMarget [2310]; bay, black points, white stripe on face; foaled May, 1895. Bred by N. P. Clarke, St. Cloud, Minn.; sire, Stanley Prince (imp.) [2265] 3971 (6315); dam, Susie McGregor (imp.) [2309] 6196. Exhibitors, D. & O. Sorby, Guelph.

3rd.

sire, Queen's Own (imp.) [1708] 7266 (7176); dam, Bonnie Bess [2228]. Exhibitors, John Miller & Son, Brougham.

YEARLING FILLY OR GELDING.

1st. Princess Alexandra [2308] 8544; bay, hind legs and near fore ankle white, stripe on face; foaled April, 1896. Bred by N. P. Clarke, St. Cloud, Minn.; sire, Prince Patrick (imp.) [2226] 6773 (8993); dam, Lillie McGregor (imp.) [2306] 3957. Exhibitors, D. & O. Sorby, Guelph.

2nd. Princess Pelle [2281]; bay, hind ankles white; foaled March, 1896. Bred by exhibitor; sire, Prince of Quality [2173] 5648; dam, Barr Bell (imp.) [1324]. Exhibitor, Robert Davies, Toronto,

3rd. Princess Beatrice [2283]; bay, blaze on face; foaled June, 1896. Bred by exhibitor; sire, Prince of Quality [2173] 5648; dam, Nelly (imp.) [1323].

BROOD MARE, WITH FOAL OF SAME BREED BY HER SIDE.

1st. Edith (imp.) [1322]; brown star on forehead, little white on hind feet; foaled May, 1888. Bred by John Mark, Stow, Scotland; imported by Graham Bros., Claremont; sire, Lord Lynedoch (4530); dam, Rory of Royth (9537). Exhibitor, Robert Davies, Toronto.

2nd. Lady Flashwood [1915]; bay, narrow ratch on face, hind legs white; foaled April, 1892. Bred by exhibitors; sire, International (imp.) [1423] (6853); dam, Effie Macgregor (imp.) [1914]. Exhibitors, Graham Bros., Claremont.

3rd. Lady St. Clair (imp.) [1205]; bay, stripe on face, right fore foot and hind feet white; foaled June, 1888. Bred by Mr. Allison, Cambusnethan, Scotland; imported by exhibitors; sire, St. Clair Erskine (4690); dam, Allison's Mare (8026). Exhibitor, Robert Davies, Toronto.

Foal of 1897.

1st. Royal Countess (2346] ; bay, stripe on face, hind feet white ; foaled April, 1897. Bred by exhibitors ; sire, The Royal Standard (imp.) [2220] 10014) ; dam, Countess of Derby [1954]. Exhibitors, Graham Bros , Claremont.

2nd. Royal Lady [2344] ; bay, stripe on face, hind feet white ; foaled April, 1897. Bred by exhibitors ; sire, The Royal Standard (imp.) [2220] (10014) ; dam, Lady Flashwood [1915]. Exhibitors, Graham Bros., Claremont.

3rd. Lady Grandeur [2337] ; dark bay, spot on forehead, both ankles white, foaled April, 1897. Bred by exhibitors ; sire, Grandeur (imp.) [1724] (6814) ; dam, Lady St. Clare (imp.) [1205]. Exhibitors, D. & O. Sorby, Guelph.

Mare with Two of Her Progeny.

1st. Candeur (imp.) [1656] ; brown, star on face, hind legs white, foaled May, 1890. Bred by J. Williamson, Langlands, Scotland, imported in 1891 by Graham Bros., Claremont ; sire, Macgregor (1487) ; dam, Darling (5148). Exhibitor, Robert Davies, Toronto.

Span of Geldings or Mares.

1st. Nelly (imp.) [1323] ; bay, stripe on face, hind legs white, foaled April, 1891. Bred by L. D. Gordon Duff, Drummuir, Scotland ; imported in 1890 by Graham Bros., Claremont ; sire, Lord Montrose (7973) ; dam, Pride of Drummuir (imp.) [1325].

Barr Bell [1324] ; light bay, striped on face, hind legs below fetlocks white, foaled May, 1888. Bred by R. Calander, Newton, Scotland ; sire, Barney (4829) : dam, Barr Jean (3314). Exhibitor, Robert Davies, Toronto.

2nd. Sonsie Lass [2313] 7660 ; bay, patch down face, hind legs white, foaled April, 1893. Bred by N. P Clarke, St. Cloud, Minn.; sire, Second Choice (imp.) [1431] 5566 (8244) ; dam Sonsie (imp.) [996] 5287.

Diana Mackay [2314] 6947 ; bay, white stripe on face, forelegs white half way to knee, hind legs white, foaled May, 1892. Bred by N. P. Clarke, St. Cloud, Minn.; sire, Mackay (imp.) [2267] 4525 (5194) ; dam, Jane Eyre (imp.) [217] 5270. Exhibitors, D. & O. Sorby, Guelph.

3rd. Jess [2210] ; chestnut, stripe on face, front feet and near hind foot white, foaled June, 1890. Bred by Wm. Foster & Son, Humber ; sire, Lochiel (imp.) [532] (2950) ; dam, Lill [2171].

Jeomine [2214] ; bay, white stripe on face, three legs and one fore fetlock white, foaled May, 1890. Bred by Jas. Mitchell, Tormore, Ont.; sire, Fitz James (imp.) [806] (5763) ; dam, Candie (imp [2212 Exhibitor, Wm. Hendrie, Toronto.

Best Mare of Any Age.

1st. Starlight [2278] 8301. Exhibitor, D. & C. Sorby, Guelph.

SHIRE HORSE BREEDERS' ASSOCIATION.

The ninth annual meeting was held at the Albion Hotel on February 8th, 1898. The minutes of last meeting read and confirmed.

PRESIDENT'S ADDRESS.

The President, MR. H. N. CROSSLEY, of Rosseau, delivered the following address :

At the eighth annual meeting of the Shire Horse Society held in the Albion Hotel on the 7th day of February 1897, I had occasion to predict, "That the future of the Shire Horse in this country was bright with promise." I stated that already an improvement in the price of horses of all classes was being experienced and would be still more felt during the succeeding twelve months.

How far this prediction has proved correct, it might be as well to pause for a few minutes to consider, and further to ask ourselves whether this gain is a permanent one or likely to be lost after a little while, or whether this improvement is capable of still further extension. It is true that very few Shires, or for the matter of that, few horses of any of the heavy breeds have been imported during the last twelve months, though there have been some ; but the importation of stallions on a larger scale cannot be expected until farmers have thoroughly recovered from the recent depression. Heavy draught stallions, of good breeding, capable of winning at shows, sufficiently mature to be put on the road with the certainty of doing a good season, call for the outlay of what to a farmer represents a large sum of money, consequently the importation of stallions on a large scale is likely to be the last sign of completely returned prosperity. That this sign will not be long in coming we have reason to believe. Reports from all stud horse owners go to show that the stallions travelled throughout the country last year made very much better seasons than they were able to make during the two or three previous years. As a result of this betterment in conditions, there has been a largely increased demand for heavy draughts and a considerable number have been syndicated throughout the country at very fair prices. It will not therefore be very long, in my opinion, before the present old stocks are worked off and fresh importations take place.

As to cheaper stock, by which I mean, young stallions, fillies and geldings, bred in Canada, there does not appear to have been a sufficient supply in the country to meet the demand, with the very natural result that prices have risen.

Messrs. Stone & Wellington report that, instead of incurring the expense and risk of shipping their young stock to England last spring, as they had fully intended doing, they were able to dispose of them at very satisfactory prices in this country. My own experience has been similiar to that of the above firm, and my stock has been reduced by sales to a greater degree than has been the case for some time past. Mr. Gardhouse and other breeders all tell the same tale. Reports from the different cartage agencies in this city, which employ almost solely heavy draught horses, all show the same state of affairs namely, that a higher price has to be given for geldings and mares fit for heavy lorries than had to be given one year ago.

Last, but not least, a constant attendance upon the sales at Grand's Repository, where horses are put up at auction to be sold without reserve to the highest bidder (a most severe and crucial test), has convinced me that the price of horseflesh has greatly improved. Mr. Smith has put himself on record as stating that the appreciation is as much as 25 per cent.

The lumbering industries of Canada, which call for the use of heavy horses on a large scale, have not yet recovered from the recent disastrous depression, but there are already signs of improvement, and it will not be long, I think, before the woods of Canada are filled once more with men and horses.

Business in general has however improved all over, in sympathy with the better crops, and just so soon as this improvement has become assured, I believe that we can look for a much larger demand for our stock, with an attendant increase in prices.

I alluded briefly in my last year's address to the influence which the coming mining boom would have on the sale of horseflesh. During the past twelve months I have studied this matter carefully, and am still of the opinion that this influence is going to be very great and far-reaching.

The demand for horses in the Rossland and other camps is already commencing to be felt; and at Edmonton and Calgary the price even of scrubs has risen no less than 50 per cent. through the demand for horses for use in the Klondyke gold fields. Bearing on this subject I might mention this fact. A statement has been made in the papers that to-day no less than 3,000 horses are lying dead on the trails to this northern mining camp. Reflecting on the above facts I am forced to the conclusion that the present increased price of horses will not only be maintained for sometime to come, but will actually advance, and that before very long we will once more see the breeding of horses a profitable industry. I note from the Secretary's report that the number of registrations is about the same as last year, and that the balance on hand has slightly increased.

The exhibit of Shires at the last year's shows was highly creditable to the breed, and compared well with that of any of the other classes. I was pleased to note one new exhibit in the section for mares—Queen of Highfield—belonging to J. M. Gardhouse, a good type of mare, which won the sweepstakes in her class.

In conclusion, gentlemen, I can only wish that my predictions may prove correct during the present year, and that when we meet again twelve months hence, it will be found that a new era of prosperity has been inaugurated for us all, and that the Shire Horse Society, which for some time past has been advaning only too slowly, may be found to have greatly increased its registrations, number of members and its balance in hand.

REPORT OF THE SECRETARY-TREASURER.

This Association has survived another year, and we may hope better accounts from it in the future. We have recorded only nine animals this year of this breed, but now that better times are looming up we will look for better results this coming year. The same exhibitors met at the fairs with nearly the same horses. A list of premiums will be compiled for the Government Report.

FINANCIAL STATEMENT.

Receipts.

1897.		
Jan.	To cash on hand	$11 40
Dec. 31	To five members	15 00
do	Registration fees	11 00
		$37 40

Expenditures.

1897.		
May 19	Stationery	$ 3 00
Dec. 31	Postage	57
	Commission of nine pedigrees	3 15
	Cash on hand	30 68
		$37 40

H. Wade,
Secretary-Treasurer.

Moved by John Gardhouse, seconded by H. J. Smith, that the Secretary-Treasurer's report be confirmed and accepted.

ELECTION OF OFFICERS.

The following officers were then elected for the ensuing year :

President : Mr. H. N. Crossley, Rosseau and Toronto.

Vice President: W. E. Wellington, Toronto.

Directors : John Gardhouse, Highfield, Jas. M. Gardhouse, Highfield, Wm. Hendrie, Jr., Hamilton, Wm. Wilkie, Toronto, H. J. Smith, Highfield, Geo. Garbutt, Thistletown, John Semple, Tottenham.

Delegate to Industrial Exhibition : John Gardhouse, Highfield.

Delegates to Western Fair, London : H. N. Crossley, Rosseau, and H. Wade, Toronto.

Delegate to Horse Breeders' Association : H. N. Crossley and W. E. Wellington.

Delegate to Central Exhibition, Ottawa : H. J. Smith, Highfield.

On motion of W. E. Wellington, seconded by John Gardhouse, it was resolved that the annual fee be reduced from $3.00 per annum to $2.00 per annum.

The meeting then adjourned.

SHIRES AT THE TORONTO INDUSTRIAL EXHIBITION.

Prizes won by Shires at the Industrial Exhibition, August 30th to September 11th, 1897

Stallion, Four Years Old and Upwards.

1st. Bravo II. (imp.) [250] (12835) ; bay, foaled in 1888. Bred by R. N. Sutton, Nelthorpe, Scawby Hall, Lincolnshire, England ; imported by exhibitor ; sire, Will-o'-the-Wisp (6574) ; dam, Boadicea by True Briton (2684). Exhibitor, H. N. Crossley, Rosseau, Ont.

2nd. Pride of Hatfield (imp.) [256] (13103) ; bay, stripe on face, three white legs, foaled in 1890. Bred by Geo. Smales, Yorkshire, England ; imported by exhibitors ; sire, Lancashire Lad 2nd (1365) ; dam, Flower (16664). Exhibitors, Morris, Stone & Wellington, Welland, Ont.

3rd. Duke of Blagdon (imp.) [257] ; dark bay, foaled August, 1892. Bred by C. Keevil, Surrey, England : imported by exhibitor ; sire, Blagdon Lincoln (12797) ; dam, Blagdon Brunette (11531). Exhibitor, J. A. Gardhouse, Highfield, Ont.

4th. Darnley (imp.) [183] (3585) ; brown, foaled in 1882. Bred by Thos. Johnston, Peterborough, England, imported by exhibitor ; sire, Champion (450) ; dam, by Temper (2137). Exhibitor, Geo. Garbutt Thistletown, Ont.

Stallion, any age.

1st. Bravo II. (imp.) [250] (12835). Exhibitor, H. N. Crossley, Rosseau.

Filly, Three Years Old.

1st. Stella [119] ; bay, white face, white stockings behind, little white on right forefoot : foaled April, 1894. Bred by exhibitors ; sire, Prince Charles (imp.) [196] ; dam, Lottie (imp.) [35] by Adam (65). Exhibitors, Morris, Stone & Wellington, Welland, Ont.

Filly, Two Years Old.

1st. Dolly [110] ; bay, front feet white, stocking on near hind foot ; foaled in 1895. Bred by exhibitors ; sire, Pride of Hatfield (imp.) [256] (13103) ; dam, Lottie (imp.) [35] by Adam (65). Exhibitors, Morris, Stone & Wellington, Welland, Ont.

2nd. Rosseau Maid [102] ; light bay, off hind leg white to hock, other points black ; foaled April, 1895. Bred by exhibitor ; sire, Bravo II. (imp.) [250] (12835) ; dam, Queen of Althorpe (imp.) [10] by Sliding Scale (6405). Exhibitor, H. N. Crossley, Rosseau, Ont.

3rd. Trilby [111] ; brown, star on forehead, spot on nose, stockings on hind feet ; foaled in 1895 ; sire, Pride of Hatfield (imp.) [256] (13103) ; dam, Queen [65] by Chieftain 2nd (imp.) [194] (5723). Exhibitors, Morris, Stone & Wellington, Welland, Ont.

YEARLING FILLY OR GELDING.

1st. Laura [112]; bay, stripe on face, near front and both hind legs white; foaled May, 1896. Bred by exhibitors; sire, Pride of Hatfield (imp.) [256] (13103); dam, Daisy [82]. Exhibitors, Morris, Stone & Wellington, Welland, Ont.

BROOD MARE WITH FOAL OF SAME BREED BY HER SIDE.

1st. Queen of Highfield [117]; bay, patch on face, one front and two hind feet white; foaled May, 1890. Bred by Jas. Gardhouse & Son, Highfield, Ont.; sire, King of the Castle (imp.) [71] (3171); dam, Maggie May by England's Glory (imp.) [79] (737). Exhibitor, J. M. Gardhouse, Highfield, Ont

2nd. Rosseau Propriety (imp.) [99]; grey, four black legs; foaled in 1894. Bred by J. T. Browne, Althorpe, Doncaster, England. Imported by exhibitor; sire, St. Flybald (4068); dam, Althorpe Dewdrop by Sampson V. (4670). Exhibitor, H. N. Crossley, Rosseau, Ont.

3rd. Daisy [82]; brown, white face, hind legs white; foaled in 1891. Bred by exhibitors; sire, Chieftain 2nd (imp.) [194] (5723); dam, Elsie Morin (imp.) [34].

FOAL OF 1897.

1st. Rosseau Boy [268]; light bay, four white legs and white face; foaled April, 1897. Bred by exhibitor; sire, Bravo II. (imp.) [259] (12835); dam, Rosseau Propriety [99]. Exhibitor, H. N. Crossley, Rosseau, Ont.

2nd. Irene [118]; bay, off hind foot white, white between eyes; foaled in 1897. Bred by exhibitors; sire, Pride of Hatfield (imp.) [256] (13103); dam, Daisy [82]. Exhibitors, Morris, Stone & Wellington, Welland, Ont.

3rd. Fitzsimmons [270]; bay, white star, three white feet; foaled in 1897. Bred by exhibitor; sire, Duke of Blagdon (imp.) [257]; dam, Queen of Highfield [117]. Exhibitor, J. M. Gardhouse, Highfield, Ont.

MARE AND TWO OF HER PROGENY.

1st. Daisy 82—progeny, Laura [112], Irene [118]. Exhibitors, Morris, Stone & Wellington, Welland, Ont

BEST MARE, ANY AGE.

1st. Queen of Highfield [117]. Exhibitor, J. M. Gardhouse, Highfield, Ont.

CANADIAN HORSE BREEDERS' ASSOCIATION.

OFFICERS FOR 1898.

President : Robert Davies, Toronto.

First Vice-President : Dr. A. Smith, Toronto.

Second Vice-President : Robert Beith, M.P., Bowmanville.

COMMITTEE APPOINTED TO MEET THE COUNTRY AND HUNT CLUB

Robert Davies, Chairman, Toronto ; Dr. A. Smith, Toronto ; Wm. Hendrie, Jr., Hamilton ; R Beith M. P., Bowmanville ; H N. Crossley, Toronto ; W. E. Wellington, Toronto ; John Macdonald, Toronto ; Robert Miller, Brougham.

Directors : Moved by W. WILKIE, seconded by GEO. PEPPER, that the representatives recommended by the different Breeders' Association be the directors of the Horse Breeders' Association. Carried.

Representing Hackney Association : Robert Beith M. P., Bowmanville ; John Macdonald, Toronto.

Representing Shire Horse Association : H. N. Crossley, Toronto ; W. E. Wellington, Toronto.

Representing Clydesdale Horse Association : Robert Davies, Toronto ; Robert Miller, Brougham.

Draught Horse Association : Alex. Innes, Clinton ; James Henderson, Belton.

Representing Thoroughbreds : Dr. A. Smith, Toronto ; Wm. Hendrie Jr., Hamilton.

Representing Pacing & Trotting Ass'n. : E. W. Cox, Toronto ; Shelton Fuller, Woodstock.

Additional Members to Committee : Moved by ROBERT MILLER, seconded by JAS. HENDERSON, "That Mr. Robert Bond, be made a member of the Horse Show Committee, outside of the Directorate." Carried.

Moved by H. N. CROSSLEY, seconded by ROBERT GRAHAM, "That Mr. Geo. Pepper be made a member of the Horse Show Committee, outside of the Directorate." Carried.

Special Committee : Robert Davies, Toronto ; H. N. Crossley, Toronto ; Dr. Smith, Toronto ; John Macdonald, Toronto ; Henry Wade, Toronto.

Secretary : Henry Wade, Toronto.

Delegates to Industrial : Robert Beith, M.P., Bowmanville ; H. N. Crossley, Toronto.

Delegates to Western Fair : R. McEwen, Byron, O. Sorby, Guelph.

SEMI-ANNUAL MEETING.

The semi-annual meeting of the Canadian Horse Breeders' Association, was held in the Albion Hotel, on September 7th, 1897.

The following members were present : Robert Davies, Chairman, Toronto ; Robt. Graham, Claremont ; John Weld, London : William Hendrie, jr., Hamilton; Robert Bond, Toronto ; H. N. Crossley, Toronto ; M. Williams, Cobourg ; A. Wilson, Paris Station ; R. Beith, M.P., Bowmanville.

The matter of the grant to the Canadian Horse Show was brought up, and the following resolution was confirmed :

Moved by WILLIAM HENDRIE JR., seconded by H. N. CROSSLEY, "That the Canadian Horse Show being now established, it is the opinion of this meeting that it should be continued, and that the Government should be again asked for a further grant for 1898." Carried.

It was also moved and seconded, "That this Association takes this, the first opportunity, to thank the President and Directors of the Industrial Exhibition for granting the request of this Association in asking for a separate ring ; they are much pleased with it both as to size and construction." Carried.

The next matter that came before the meeting was the manner in which horses were judged at the Industrial Exhibition, and after a short discussion on the subject and on the fence around the ring, the following resolution was passed.

Moved by M. WILLIAMS, seconded by WILLIAM HENDRIE, JR., "That this Association desires that the judging of all horses be done in the future in one ring, and on the second week only, and that a programme be drawn up and be strictly adhered to, arranging the time for each section of a class to be shown." Carried.

They also recommend that the fence around the ring be reduced in height for the comfort of the spectators, and that a twelve-foot walk be provided around the outside of the fence. Carried.

MEMBERS OF CANADIAN HORSE BREEDERS' ASSOCIATION.

Name.	Address.	Name.	Address.
Archibald, C. A	Truro, N. S.	Howard, W. J	Dollar.
Beith, Robert	Bowmanville.	Innes, Alex	Clinton.
Beck, Adam	London.	Irving, Thos	Winchester.
Biggins, W. J	Clinton.	Johnston, Arthur	Greenwood.
Bowker, A. G., V.S	Woodstock.	Lawrence, W. A	Milton.
Brady, Thos	Chatham.	Miller, Robert	Brougham.
Bolte, A	Toronto.	Moore, Geo	Waterloo.
Bond, R	"	Myles, Robert	Toronto.
Bovyer, F. G	Charlottetown, P.E.I.	Macdonald, John	"
Cargill, H	Cargill.	McCrae, D	Guelph.
Carruthers, Jas	Toronto.	McEwen, Robert	Byron.
Canfield, Jas	Woodstock.	McMaster, Capt. W. F	Toronto.
Christie, Wm	Toronto.	Ontario Agricultural College	Guelph.
Cochrane, Jas. A	Hillhurst, Que.	Pepper, Geo	Toronto.
Cox, E. S	Toronto.	Quinn Bros	Brampton.
Cox, E W	"	Ramsay, A. G	Hamilton.
Crossley, H. N	"	Robson, Capt. T. E	Ilderton.
Crow, T. A.	"	Sibbald, F. C	Sutton West.
Davidson, John	Ashburn.	Simpson, D. B	Bowmanville.
Davies, Robt	Toronto.	Smith, Dr. A	Toronto.
Edwards, W. C, M.P	Rockland.	Smith, Hugh	Claude.
Elliott, C, V.S	St. Catharines.	Smith, W. Harland	Toronto.
Fuller, S. B	Woodstock.	Sorby, D	Guelph.
Gardhouse, James M	Highfield.	Sorby, O	"
Gibson, Richard	Delaware.	Taylor, T. B	Toronto.
Graham, J. D	Toronto.	Vipond, John	Brooklin.
Graham, Robert	Claremont.	Wellington, W. E	Toronto.
Henderson, Jas	Belton.	Wilkie, Wm	"
Hendrie, Wm	Hamilton.	Wood, R. Shaw	London.
Hodgson, Thos	Toronto.	Wood, Hon. S. C	Toronto.
Holderness, John	"		

ANNUAL MEETING.

The fourth annual meeting of the Canadian Horse Breeders' Association was held in the Albion Hotel, Toronto, at 8 p,m., on February 9th, 1898.

The following members were present:

Robert Davies, Toronto; Dr. A. Smith, Toronto; John Macdonald, Toronto; John Holderness, Toronto; H. N. Crossley, Toronto; W. E. Wellington, Toronto; J. Henderson, Belton; John Vipond, Brooklin; William Wilkie, Toronto; Robert Miller, Brougham; C. A. Archibald, Truro, N. S.; F. G. Bovyer, Charlottetown, P. E. I.; W. J. Biggins, Clinton; Geo. Pepper, Toronto; O. Sorby, Guelph; J. M. Gardhouse, Highfield; Wm. Weld, London; A. Innes, Clinton; John Davidson, Ashburn; W. J Howard, Dollar; Robert Bond, Toronto; S. Fuller, Woodstock; H. Wade, Sec Treas., Toronto; J. O. Snell, London.

REPORT OF THE SECRETARY-TREASURER.

The third horse show was held at the Armouries and was a great success. (See report).

A special meeting of the Horse Breeders' Association was held at the Albion Hotel on the 30th of December, as per minutes read, at which a deputation was appointed to wait on the commanding officers of the military, and I am sorry to say that the answer from Lieut Col. Otter was adverse to amalgamation, so it now seems that we must secure another building for the horse show, as it will never do to give it up.

FINANCIAL STATEMENT.

THE CANADIAN HORSE SHOW, 1897.

Receipts.

1897.	Canadian Horse Breeders' Assoc'n	$2,000 00
	Hackney Horse Society	100 00
	Horse Breeders' Association	100 00
	Clydesdale Association	80 00
	Electoral District Society	25 00
	Industrial Exhibition	40 00
	English Hackney Association	50 00
	Subscriptions	900 00
	Grant from Toronto City	500 00
	Entry money	1,085 00
	Subscriptions and sundries	4,048 10
		$8,928 10

Expenditure.

1897.	Prizes in cash and plate		$3,903 00
	Grant to military		300 00
	Expenses of running show		4,136 08
	Profit divided equally,		
	Hunt Club	$294 51	
	Horse B. Ass'n	294 51	
			589 02
			$8,928 10

CANADIAN HORSE BREEDERS' ASSOCIATION.

Financial Statement for Year Ending December 31st, 1897.

Receipts.

1897. Jan. 1.	Balance on hand	$589 91
	62 members' fees	62 00
	Legislative Grant	2,000 00
	Interest on deposit	2 74
	Share of profit on horse show, (see above)	294 51
		$2,949 16

Expenditure.

1897.	Prize to Horse Show	$100 00
	Legislative Grant to Horse Show	2,000 00
	Stationery and postage	13 45
	Balance on hand	835 71
		$2,949 16

I hereby certify that I have examined the books of the Canadian Horse Breeders' Association, and that the foregoing financial statement for the year ending December 31st, 1897, is in accordance therewith.

CHAS. F. COMPLIN,
Auditor.

PRESIDENT'S ADDRESS.

The President, Mr. Robert Davies, delivered the following address: From present indications, I think we will in a few days be able to report to you very favorably on the matter of a horse show, combining with the Toronto Hunt Club and the military authorities. Last year our show was a success, and, I think on the whole, it gave general satisfaction; and I believe the breeders of all classes of horses will thoroughly endorse the statement that this show is the means of stimulating and improving the breeds of horses of this country, both light and heavy. I will now call upon our Secretary to read the minutes of the last meeting, and also report our financial standing; and I have some resolutions which I wish to place before you this evening. We are here to whip out a discussion on them. We are here, not interested in one breed of horses but in all breeds, and we are going to ask the Government to assist us in the matters referred to in the resolutions, as they ought to assist us in the good work in which we are engaged.

Moved by H. N. Crossley, seconded by Dr. Smith, that the minutes of the last annual meeting be adopted as well as the annual report. Carried.

GOVERNMENT INSPECTION AND LICENSE.

At this stage of the meeting President Davies read a resolution, which had been prepared to petition the Government to establish an inspection and licensing system for all horses standing for service in Ontario, and a discussion took place.

The following resolution was then moved by Jas. Henderson, of Belton, seconded by S. Fuller, of Woodstock:

"Resolved that we the members of the Horse Breeders' Association of Canada, do petition the legislature of Ontario at its next session, to establish an inspection and licensing system for all horses standing for service in Ontario, and that Messrs S. Fuller, Dr. A. Smith, Robert Davies, A. Innes, R. Miller, R. Graham, R. Beith, O. Sorby, Wm. Wilkie, John Davidson, H. N. Crossley and Wm. Hendrie, jr., be a Committee to draft a petition to that effect, to consider the details of a system to be adopted, and to secure the introduction of a bill in the legislature founded thereon". Carried.

Moved by Robert Davies, seconded by John Macdonald, and resolved, "That in view of the fact that the foreign horse trade of the Dominion for the last two years has shown a falling off, whereas that of the United States has increased, and that the Government of that country is making strenuous attempts to further improve it, we do petition the Government at Ottawa to oppoint a committion of enquiry as to the best steps to be taken to develop the trade in horses with foreign countries and to encourage the breeding of the same." Carried.

The resolution confirmed at the hackney meeting, *re* Graham Bros. and the Illinois State Board of Agriculture, was also endorsed at the meeting.

Delegates to Ottawa: Wm. Hutchison M.P., Ottawa; Robert Graham, Claremont.

Delegates to Montreal: Jas. A. Cochrane, Hillhurst, Que.; Robert Bond, Toronto.

Delegates to Woodbridge Fair: Robert Bond, Toronto; John Macdonald, Toronto.

Delegate to Provincial Exhibition P. E. I.: Frank Bovyer, Georgetown, P. E. I.

Moved by William Wilkie, seconded by John Macdonald. "That the thanks of this meeting be tendered Mr. Robert Davies for the able manner in which he has presided over this Association during the past." Carried amid loud applause.

The meeting then adjourned.

DIRECTORS' MEETING.

A meeting of the directors of the Horse Breeders' Association was held in Toronto on Feb. 23rd 1898.

Present: R Davies, Chairman; Messrs S. Fuller, H. N. Crossley, Dr. A. Smith, Geo. Pepper, R. Bond and H. Wade.

The following letter was read from Mr. Stewart Houston of the Country and Hunt Club:

TORONTO, Feb. 23rd. 1898.

MY DEAR MR. WADE.—I enclose you herewith a copy of the agreement which a joint Commitee of representatives of the Breeders' Association and Hunt Club authorized on Monday, and which was subsequently accepted by the Military Tournament. On behalf of the Hunt Club at our Joint Meeting on Monday I stated that if your Association preferred to have a settlement of accounts on the basis of the alternative agreement (a copy of which I enclose) the Hunt Club would be prepared to guarantee a settlement to the Breeders' Association on this basis. The Hunt Club would however prefer that the Breeders' Association should be united with them on the same financial footing, but as time was pressing on Monday, and in order to close the matter, the Hunt Club offered this option to your Association. The alternative agreement has certain advantages; if the profits are over $3,050 the sharing agreement would be a little better for us than under the agreement accepted by the Military. If however the profits are less than $3,050 the only advantage the alternative has is, that instead of the Breeders' Association paying one-half of the loss, if any, it pays one-third. It seemed to the Hunt Club that the possibility of saving one-sixth of the loss, in case there should be one, did not compensate for certain advantages which the Military proposition has. I enclose you, in addition to the draft of the Military proposition and the alternative agreement, the formal agreement which will be signed by the Hunt Club, Breeders' Association and Military Tournament. Will you kindly have a formal resolution passed at your meeting authorizing the President and Secretary to sign this agreement on behalf of the Horse Breeders' Association? I am confident the combined event can be made a great success, and that with a little work on our part it will be secure against loss. The profits may not be very large, but we will have the satisfaction of keeping up the Horse Show and of doing our best for one of the most important industries of the country.

You will see that under the affairs of the Horse Show it will be conducted by a Committee of twelve, of whom six are from the Hunt Club and six from the Breeders' Association. There is a small executive Committee for joint business, composed of eight and a chairman, of whom four represent the Horse Show, two from the Hunt Club and two from the Breeders' Association. The smaller Committee deals only with matters of joint interest.

I remain, very faithfully yours,
STEWART HOUSTON.

The Directors then considered the formal agreement to be signed by the Military, Horse Breeders' Association and Country and Hunt Club, and made some amendments to be considered by the Horse Show Committee. This agreement will be found in the minutes of the Horse Show Committee.

Moved by DR. SMITH, seconded by ROBERT BOND, "That this agreement as amended be executed by the President and Secretary of the Horse Breeders' Association." Carried.

Moved by GEO. PEPPER, seconded by SHELTON FULLER, "That the original agreement, as accepted by the Military, Hunt Club and Horse Breeders' Association on Monday, the 21st last, be the agreement this Association accepts, being a half partnership with the Country and Hunt Club."

It was resolved that the following gentlemen be the Committee of six, to be called the Horse Show Committee:—Robert Davies, Dr. A. Smith, H. N. Crossley, Shelton Fuller, Geo. Pepper, Wm. Hendrie, jr., H. Wade, Secretary-Treasurer.

DIRECTORS' MEETING.

A meeting of Directors was held at Albion Hotel, Toronto, on March 24th, at 3.30 p.m.

Present: R. Davies, in the chair; Messrs. R. Miller, H. N. Crossley, S. Fuller, Wm. Hendrie, jr., R. Bond and H. Wade.

The following names were submitted as proper persons to judge at the Spring Horse Show.

Thoroughbreds: T. C. Patteson, Toronto; Geo. Torrance, Toronto.

Standard Bred: Dr. Elliott, V.S., St. Catharines; Dr. Hodgson, V.S., Toronto.

Coach and Shire: Richard Gibson, Delaware; J. Y. Ormsby, Woodstock.

Hackneys: Richard Gibson, Delaware; Jas. A. Cochrane, Hillhurst, Que.

Clydesdales: Geo. Moore, Waterloo; Arthur Johnston, Greenwood.

The meeting then adjourned.

FOURTH ANNUAL CANADIAN HORSE SHOW.

The Armouries building, Toronto, the only building, not only in Toronto but in the Province of Ontario, capable of accommodating such an array of horses as is seen at the Spring Show every year and a large number of spectators as well, was once more the scene where the Fourth Annual Canadian Horse Show was held.

The partnership entered into for the last three years with the Country and Hunt Club of Toronto, for the purpose of securing a bigger turnout of horses and a better attendance, was again renewed, and a further extension of it was made to include the Military authorities of Toronto and the district, who were meditating a Military Tournament to be held at or about the same time as the Horse Show.

The selection of a date for the Show presented some difficulties. The representatives of the Horse Breeders' Associations wished to have the Show held during April, in order that owners of Stallions could show their horses before sending them out on their various routes. To this it was objected that a large attendance of spectators could not be secured so early in the season, and, moreover, the Military were not prepared to hold their tournament just then. After several meetings to discuss the question, the Breeders decided that it was better to acquiesce in the later date proposed, viz. May, 4th, 5th, 6th, and 7th, 1898, rather than run the risk of failure by holding the Show a short time before the Military Tournament. It was felt that the gate receipts would be seriously diminished were two exhibitions held so close together, and it was probable that the majority of the city people, on whom the Horse Show has to depend so largely as spectators, would succumb to the (to them) superior attractions of the Tournament Another strong argument in favor of holding a joint Show was the great saving made in avoiding the expense of fitting up the building twice.

Under these circumstances an agreement was entered into with the Military authorities for a four days' Show and Tournament, the ring for half the time being under the control of the Breeders' Association and half the time devoted to exhibitions of military skill.

A very satisfactory arrangement was made whereby the majority of the breeding classes were shown on the first day, and, in fact, all the Heavy Breeds were judged on the first day. This enabled owners of stallions to show their horses and get them back at once to their respectives routes with very little loss of time therefrom. Had the breeders been quicker to recognise this fact, we are certain that the breeding classes would have been much more largely filled.

The results of the Show were extremely satisfactory. The number of horses entered exceeded that of last year by forty head, and although the increases were mostly in the Harness and Saddle Classes, yet in these classes there were found entries of breeders who competed (and in several cases very successfully) against the aristocratic turn-outs of wealthy city exhibitors. The Show was favored with fine weather, and, in consequence, the attendance, especially in the evenings, was very large, thus swelling the gate receipts sufficiently to leave on hand a satisfactory balance after paying all expenses.

The amount offered in prizes this year was $3,600, the major share of which went to the breeding classes, or to classes in which breeders are interested.

Thoroughbred Stallions were out in good numbers, and, in quality and conformation, were above the average. Coach and Standard Bred Stallions were very fair, while the Hackney classes, as usual, proved very attractive. Shires and Clydesdale were not numerously represented, but, among the later were some fine stallions imported by Robert Davies, Toronto, as well as some of his choice home-bred ones, a very promising pair of young mares shown by Jas. I. Davidson & Son, Balsam, and good animals belonging to other exhibitors.

As the display in the Harness and Saddle classes last year excelled that of the year previous, so, both in numbers and quality, did these classes this year prove superior to those of 1897. There were very few culls to be found anywhere, in spite of the increased number of entries. There is thus distinct progress to be noted in the care shown in breeding carriage and saddle horses in this country, and for this the Spring Show should certainly receive due credit. It is a stimulus to breeders to breed carefully and from the best only. There they find their level, and that level is becoming a higher one every year. With an improvement in the horse trade, such as is taking place to-day, there is always the temptation to keep for breeding purposes inferior animals, because for a time such can be sold on account of the scarcity of good ones, which are snapped up so quickly. At a show like this, however, a man who has been unwise enough to invest in an inferior animal soon gets undeceived should he venture to bring it into the Show ring, and he there learns a lesson which he will not soon forget.

The importance of the Spring Show is fully recognized by the Ontario Government and the Horse Associations of Canada, who readily make a grant of money every year to aid in maintaining a prize list sufficient to induce exhibitors to strain every effort to make a first-class display. The only weak point this year was in some of the breeding classes, which were not so well filled as they ought to have been. The remedy for this is the holding of the Show a little earlier in the season. This has now been recognized by both Breeders and the Military authorities, and the date selected for next year's Show will be one to which no exception can be taken.

PRIZE LIST.

The list of prizes awarded at the Fourth Annual Canadian Horse Show, held in the Armouries, Toronto, on May 4th, 5th, 6th and 7th, 1898, is as follows:

THOROUGHBREDS.

Stallions, Foaled Previous to January 1st, 1895.

Judge:—R. R. Pringle, Toronto.

1st. Morpheus, chestnut, aged. Exhibited by J. E. Seagram, M.P., Waterloo, Ont.; sire, Wenlock; dam, Golden Dream.

2nd. Strathclyde, chestnut, foaled in 1889. Exhibited by Wm. Hendrie, Hamilton, Ont.; sire, Strathmore; dam, Bridal.

3rd. Terremont, 109, bay, foaled in 1894. Exhibited by A. Frank & Sons, The Grange, Ont; sire, Dandie Dinmount; dam, Jenny Lind.

Stallions, Foaled on or Subsequent to January 1st, 1895.

1st. Romancer, chestnut, foaled in 1895. Exhibited by J. E. Seagram, M.P., Waterloo, Ont.; sire, Prince Royal, dam, Satin.

2nd. Unnamed, bay, foaled in 1895. Exhibited by Gates & Elliott, Toronto; sire, Leonatus; dam, Vienna.

3rd. V. R. Customs, bay, foaled in 1895. Exhibited by W. F. Maclean, Toronto; sire, Duke of Montrose; dam, Query.

Stallions, Qualified to Improve the Breed of Saddle Horses and Hunters.

1st. Othmar, bay, foaled in 1889. Exhibited by Wm. Hendrie, Hamilton, Ont.; sire, Onondaga; dam, Jocose.

2nd. Trinity, chestnut, foaled in 1888. Exhibited by Robt. Thomson, Hamilton, Ont.; sire, Forester; dam, British Beauty (imp.).

3rd. Godard, chestnut, foaled in 1885. Exhibited by Graham Bros., Claremont, Ont.; sire, King Ban (imp.); dam, Ella Breckenridge.

Filly or Gelding, Bred and Owned by Exhibitor, not Thoroughbred, Foaled on or Subsequent to January 1st, 1895. Sired by a Thoroughbred Stallion and to be Shown on Line.

1st. Peacock bay g., foaled in 1895. Exhibited by G. Pepper (agent), Toronto; sire, Regent.

2nd. Prince, bay g., foaled in 1895. Exhibited by T. H. Hassard, Millbrook, Ont.; sire, Tyrone.

3rd. Queensberry ch. g., foaled in 1895. Exhibited by G. Pepper (agent), Toronto; sire, Tulloch Gosrum.

CARRIAGE OR COACH HORSES.

Stallions, Foaled Previous to January 1st, 1896; Not Less Than 16 Hands in Height.

Judge:—R. Gibson, Delaware, Ont.

1st. Graf Bremer (German), brown, foaled in 1889. Exhibited by Jas. McCartney, Thamesford, Ont.

2nd. Prince George, bay, foaled in 1893. Exhibited by W. C. Brown, Meadowvale, Ont.; sire, Prince Victor; dam, Hattie Bell.

3rd. Hannibal, black, foaled in 1890. Exhibited by Donald Watson, Maple, Ont.; sire, Marquis (778) dam, Magdalen (imp.).

STANDARD BRED ROADSTERS.

Stallion, Foaled Previous to January 1st, 1896.

Judge:—C. E. Elliott, V. S., St. Catharines, Ont.

1st. Larabie the Great, 30345, bay, foaled in 1892. Exhibited by Maclaren Stock Farm, Buckingham, Que.; sire, Jay Bird; dam, Kate Brooks.

2nd. Altoneer, 17493, bay, foaled in 1890. Exhibited by Edmond Taylor, Toronto; sire, Sphinx, 5343; dam, Pilotina Wilkes.

3rd. Frazier, 22593, bay, foaled in 1887. Exhibited by Jas. McCartney Thamesford, Ont.; sire, Zilcaodi Golddust; dam, Nelly.

HACKNEYS

Stallions, Foaled Previous to January 1st, 1895.

Judge:—R. Gibson, Delaware, Ont.

1st. Royal Standard (imp.)—55—(3918), bay, white hind feet, 15.3½, foaled in 1890. Bred by B. H. Lane, Limavady, Ireland; imported in 1895, and exhibited by Graham Bros., Claremont, Ont.; sire, Excelsior (198); dam, Royal Lady (imp.) (379).

2nd. Banquo—3—dark bay, star on face, four white feet; foaled in 1892. Bred and exhibited by Robert Beith, M.P., Bowmanville, Ont.; sire, Jubilee Chief (imp.)—1—(2122); dam, Mona's Queen (imp.) —4—(5887).

3rd. Courier (imp.)—26—(1751), bay, 16; foaled in 1887. Bred by C. E. Cooke, Litcham, Norfolk, Eng., imported in July, 1890, by Dr. W. Seward Webb, Shelbourne, Vt., U.S. Exhibited by Graham Bros., Claremont, Ont.; sire, Canvasser (114); dam, May Day (479).

4th. Rosseau Performer (imp.)—34—chestnut roan, foaled in 1893. Bred by John T. Browne, Doncaster, Yorkshire, Eng.; imported in 1894. Exhibited by H. N. Crossley, Rosseau, Ont.; sire, Enthorpe Performer (2973); dam, Fanny (111).

STALLIONS, FOALED SUBSEQUENT TO AND ON JANUARY 1ST, 1895.

1st. Rosseau Swell—71—roan ; foaled in 1897. Bred and exhibited by H. N. Crossley, Rosseau, Ont.; sire, Royal Standard (imp.)—55—(3918) ; dam, Althorpe Countess (imp.)—20—(6357).

2nd. Hortensio—69—bay, fore foot and both hind feet white ; foaled in 1897. Bred and Exhibited by Robert Beith, M.P., Bowmanville, Ont.; sire, Jubilee Chief (imp.)—1—(2122) ; dam, Mona's Queen (imp.)—4—(5887).

MARES, FOALED SUBSEQUENT TO AND ON JANUARY 1ST, 1895.

1st. Cassandra—83—brown, star and two white feet ; foaled in 1895. Bred and exhibited by Robert Beith, M.P., Bowmanville, Ont.; sire, Jubilee Chief (imp.)—1—(2122) ; dam, Mona's Queen (imp.) —4—(5887).

2nd. Miss Roberta—78—dark bay, near hind foot and ankle white, star on forehead and snip on nose ; foaled in 1897. Bred and exhibited by H. N. Crossley, Rosseau, Ont.; sire, Rosseau Performer (imp.) —34—(5391) ; dam, Lady Bird (imp.)—15—(5510).

3rd. Bianco—76—chestnut, white star, one fore and two hind feet white ; foaled in 1896. Bred and exhibited by Robert Beith, M.P., Bowmanville, Ont.; sire, Sea Gull—8—(2261) ; dam, Cherry Ripe—70—567.

HIGH STEPPER, MARE OR GELDING, NOT UNDER 15 HANDS; CONFORMATION AND STYLE OF GOING, AS WELL AS HIGH ACTION, TO BE CONSIDERED; TO BE SHOWN BEFORE A SUITABLE CONVEYANCE, AND SIRED BY A REGISTERED HACKNEY STALLION.

1st. Blucher, ch. g., 15.3½, 6 years. Exhibited by T. A. Crow, Toronto ; sire, Jubilee Chief—1—.

2nd. Mildred, br. m., 16, 6 years. Exhibited by E. B. Clancy, Toronto ; sire, Fire Fly (imp.).

3rd. Mopsa—40—bay, black points, foaled in May, 1895. Bred and exhibited by R. Beith, M.P., Bowmanville, Ont.; sire, Ottawa (imp. in dam)—2—(4440) ; dam, Lady Aberdeen (imp.)—5—(5482) by Lord Derwent II. (1034).

SWEEPSTAKES—BEST HACKNEY STALLION, ANY AGE, GIVEN BY THE HACKNEY HORSE SOCIETY.

1st. Royal Standard—55—Exhibitors, Graham Bros., Claremont, Ont.

SWEEPSTAKES—BEST HACKNEY MARE, ANY AGE, GIVEN BY THE HACKNEY HORSE SOCIETY.

1st. Cassandra—83—Exhibitor, R. Beith, M.P., Bowmanville, Ont.

SWEEPSTAKES—BEST HACKNEY MARE OR FILLY, BY AN IMPORTED SIRE OUT OF AN IMPORTED DAM, BOTH REGISTERED IN THE ENGLISH HACKNEY STUD BOOK, GIVEN BY HACKNEY HORSE SOCIETY OF GREAT BRITAIN. SILVER MEDAL.

1st. Cassandra—83—Exhibitor, R. Beith, M.P., Bowmanville, Ont.

SWEEPSTAKES—BEST HACKNEY STALLION OR ENTIRE COLT, BY AN IMPORTED SIRE OUT OF AN IMPORTED DAM, BOTH REGISTERED IN THE ENGLISH HACKNEY STUD BOOK, GIVEN BY HACKNEY HORSE SOCIETY OF GREAT BRITAIN. SILVER MEDAL.

1st. Banquo—3—Exhibitor, R. Beith, M.P., Bowmanville, Ont.

SHIRES.

STALLIONS, FOALED PREVIOUS TO JANUARY 1ST, 1895.

JUDGE :—J. Y. Ormsby, V. S., Woodstock.

1st. Active, alias Garth [269], chestnut, strip on face, one hind foot white ; foaled in 1893. Bred by C. W. Nichols, Spring Creek, Pa., U.S ; exhibited by J. M. Gardhouse, Highfield, Ont.; sire, Wonder of the Ferry (imp.) [117] 3124 (12531) ; dam, Somersham Gem (imp.)—95—2987.

SHIRE STALLIONS, FOALED SUBSEQUENT TO AND ON JANUARY 1ST, 1895.

1st. Fitzsimmons [270], bay, white star, three white feet ; foaled in 1897. Bred and exhibited by J. M. Gardhouse, Highfield, Ont.; sire, Duke of Blagdon (imp.) [257] dam, Queen of Highfield [117].

MARE, ANY AGE.

1st. Queen of Highfield [117], bay, ratch on face, one front and two hind feet white ; foaled in 1890. Bred by Jas. Gardhouse & Son, Highfield, Ont.; exhibited by J. M. Gardhouse, Highfield ; sire, King of the Castle (imp.) [71] (3171) ; dam, Maggie May, by England's Glory (imp.) [79] (737).

SWEEPSTAKES—BY INDUSTRIAL EXHIBITION ASSOCIATION, FOR BEST SHIRE STALLION, ANY AGE, EITHER IMPORTED OR CANADIAN BRED. GOLD MEDAL.

1st. Active, alias Garth [269]. Exhibitor, J. M. Gardhouse, Highfield, Ont.

CLYDESDALES.

STALLIONS, FOALED PREVIOUS TO JANUARY 1ST, 1895.

JUDGE :- George Moore, Waterloo, Ont.

1st. King's Own [2172], brown, off hind foot white; foaled May, 1894. Bred and exhibited by Robert Davies, Toronto; sire, Queen's Own (imp.) [1708] (7176); dam, Candour (imp.) [1656].

2nd. Macqueen [2218], dark bay, ratch on face, hind heels white; foaled in 1894. Bred and exhibited by Alex. Doherty, Ellesmere: sire, Queen's Own (imp.) [1708] (7176); dam, Miss Fleming [1919].

STALLIONS, FOALED IN 1895.

1st. Border Riever (imp.) [2307], brown, star on face, near fore foot, off hind leg and near hind foot white; foaled in 1895. Bred by Lord Polwarth, St. Boswell's, Scotland. Imported and exhibited by Robt. Davies, Toronto; sire, Prince of Millfield (9650); dam, Connie Nairn (11569).

2nd. The General [2339], bay, white face, white hind feet; foaled in 1895. Bred and exhibited by John Vipond, Brooklin, Ont.; sire, Queen's Own (imp.) [1708] (7176); dam, Brooklin Metal (imp.) [1877] (11166).

3rd. Goldfinder II. [2289], brown, face and hind legs white; foaled in 1895. Bred by Wm. Kerr, Houdston, Scotland; imported by Innes & Horton, Clinton, Ont. Exhibited by James Henderson, Belton, Ont.; sire, Goldfinder (6807); dam, Stylish Lady, by Easterfield Style (6724).

STALLIONS, FOALED IN 1896.

1st. Tom Macgregor (imp.) [2313], bay, stripe on face, hind legs white below hocks; bred by James McClean, Auchneil, Stranraer, Scotland. Imported and exhibited by Robt. Davies, Toronto; sire, Macgregor (1487); dam, Jenny Bell (2595).

2nd. Prince of Blantyre [2239], bay, white blaze on face, hind heels white; foaled in 1896. Bred and exhibited by Alex. Doherty, Ellesmere, Ont.; sire, Prince of Quality (imp.) [2173] (5648); dam, Miss Fleming (imp.) [1919], by Master of Blantyre (2283).

3rd. Prince Royal [2243], bay, stripe on face, hind legs white; foaled in 1896. Bred and exhibited by Robt. Davies, Toronto; sire, Prince of Quality (imp.) [2173], 5648; dam, Young Lily (imp.) [1672].

CANADIAN-BRED CLYDESDALES.

Open for Canadian bred horses only. A Canadian bred horse is defined by the Clydesdale Association for exhibition purposes as a horse that does not trace on the side of its dam to an imported mare, and has been foaled in Canada.

STALLIONS FOALED PREVIOUS TO JANUARY 1, 1896.

1st. Bay Wattie [2288], bay, white stripe, off front and both hind feet white, foaled in 1894. Bred and exhibited by Wm. J. Howard, Dollar, Ont.; sire Red Wattie (imp.) [2287] (8183); dam, Doll Burns [1510], by Prince Imperial (imp.) [74] (1262).

MARES, IMPORTED OR CANADIAN BRED, ANY AGE.

Kate Hill 3rd [2221] 8127, light chestnut, white on face, hind legs white, foaled in 1894. Bred and exhibited by James I. Davidson & Son, Balsam, Ont.; sire, Westfield Stamp (imp.) [1819] (9467); dam, Kate Hill (imp.) [215] (4129).

2nd. Boydston Lass 7th [2286], bay, ratch on face, four white feet, foaled in 1894. Bred and exhibited by James I. Davidson, Balsam, Ont.; sire, Westfield Stamp (imp.) [1819] (9467); dam, Boydson Lass 3rd [1927].

SWEEPSTAKES—BEST CLYDESDALE STALLION, ANY AGE, IMPORTED OR CANADIAN BRED; PRESENTED BY TORONTO ELECTORAL DISTRICT AGRICULTURAL SOCIETY.

1st. Border Riever [2307]. Exhibitor, Robert Davies, Toronto.

Draught Pair Mares or Geldings, any breed whatever, Shown in Harness.

1st. Boydston Lass 7th [2286], b.m., 3 years; Kate Hill 3rd [2221], light chestnut m., 3 years. Exhibitor James I. Davidson & Son, Balsam, Ont.

2nd. Thumper, b.g., 17.1, 6 years; Rasper, b.g., 17, 6 years. Exhibitor, Wm. Hendrie, Toronto.

3rd. Net. b.m., 5 years; Jess, b.m., 4 years. Exhibitor. F. B. Fenwick, Coleraine, Ont.

HARNESS, SADDLE, HUNTING AND SPECIAL CLASSES.

HORSES IN HARNESS.

Mare or Gelding, not exceeding 15 hands 2 inches. To be Shown to a Gig, Cart or Phæton

Judges.—Harry Hamlin, Buffalo; Seward Cary, Buffalo.

1st. Coronet, br.m., 15.1, 5 years. Exhibitor, G. Pepper (agent), Toronto.

2nd. Mopsa—40—bay m., 3 years. Exhibitor, R. Beith, M.P., Bowmanville.

3rd. Rosalind—36- br.m., 4 years. Exhibitor, R. Beith, M.P., Bowmanville.

Mare or Gelding, over 15 hands 2 inches. To be Shown to a Gig, Dog-cart or Phæton.

1st. Blucher, ch.g., 15.3½, 6 years. Exhibitor, Thomas A. Crow, Toronto.

2nd. Headlight, b.g., 15.2½, 5 years. Exhibitor, S. B. Fuller, Woodstock, Ont.

3rd. Phyllis, b.m., 16, 5 years. Exhibitor, E. B. Clancy, Toronto.

Pair of Horses, not exceeding 15 hands 2 inches. To be Shown to a Four-wheeled Vehicle

1st. Mopsa—40—b.m., 3 years; Rubicon, b.g., 4 years. Exhibitor, R. Beith, M.P., Bowmanville.

2nd. Rosalind—36—F.S., br.m., 4 years; Royal Jubilee, bl. g., 4 years. Exhibitor, R. Beith, M.P., Bowmanville.

3rd. Wallace, b.g., 15.1¾, 4 years; Bruce, b.g., 15.1¾. Exhibitor, Thos. A. Crow, Toronto.

Pair of Horses, over 15 hands 2 inches. To be Shown to an Appropriate Four-wheeled Vehicle.

1st. Monte Christo, ch.g., 15.3, 7 years; St. Elmo, ch.g., 15.3, 8 years. Exhibitor, S. F. McKinnon, Toronto.

2nd. Wellington, br.g., 15.3½, 6 years; Blucher, ch.g., 15.3½, 6 years. Exhibitor, Thomas A. Crow, Toronto.

3rd. Phyllis, b.m., 16, 5 years; Mate, b., 16, 5 years. Exhibitor. E. B. Clancy, Toronto.

Pair of Horses, not under 15 hands 2 inches. To be Shown Before a Brougham. Horses to count 60 per cent., Brougham and General Appointments 40 per cent.

1st. Blazeaway, roan g., 16, 5 years; Comet, roan g., 16, 5 years. Exhibitor, J. Ross Robertson, M.P., Toronto.

2nd. Major, b.g., 15.2; Floss, b.m., 15.2. Exhibitor, P. Maher, Toronto.

TANDEMS.

Harness Tandems, Wheeler to be over 15 hands.

Judges—Harry Hamlin, Buffalo; Seward Cary, Buffalo.

1st. Wellington, br.g., 15.3½, 6 years; Blucher, ch.g., 15.3½, 6 years. Exhibitor, Thomas A. Crow, Toronto.

2nd. Coronet, br.m., 15.1, 5 years; Bruce, br.g., 15.2, 6 years. Exhibitor, G. Pepper (agent), Toronto.

FOUR-IN-HANDS.

Teams not under 15 hands. May be Shown Before a Coach, Drag or Brake.

Judges—Harry Hamlin, Buffalo; Seward Cary, Buffalo.

1st. Exhibitor, R. Beith, M.P., Bowmanville.

2nd. Exhibitor, Quin Bros., Brampton.

SADDLE HORSES.

MARE OR GELDING, OVER 14 HANDS 2 INCHES AND NOT EXCEEDING 15 HANDS 2 INCHES.

JUDGES—J. N. Scatcherd, Buffalo; Colin Campbell, Montreal.

1st. Rainbow, br.g., 15.1½, 5 years. Exhibitor, Brock Fuller, Woodstock.
2nd. The Sculptor, br g., 15.2, 6 years. Exhibitor, A. R. Curzon, Guelph.
3rd. Spark, b.g., 15.1, 5 years. Exhibitor, F. A. Campbell, Toronto.

MARE OR GELDING OVER 15 HANDS 2 INCHES.

1st. Rufus, ch.g., 16, 7 years. Exhibitor, Hume Blake, Toronto.
2nd. Exclusive, br.g., 15.3, 6 years. Exhibitor, Gordon Grand, East Orange, N.J.
3rd. Gold Star, ch.g. Exhibitor, G. A. Stimson, Toronto.

LADIES' SADDLE HORSE, NOT UNDER 14 HANDS 3 INCHES.

1st. Exclusive, br.g., 15.3, 6 years. Exhibitor, Gordon Grand, East Orange, N.J.
2nd. Queen B., br.m., 15.3½, 7 years. Exhibitor, A. R. Curzon, Guelph.

BEST SADDLE AND HARNESS HORSE.

Mare or Gelding, 15 hands and over, to be shown first in harness then under saddle in same class. Quality and manners to be specially considered.

1st. Black Patti, blk.m., 16.1, 5 years. Exhibitor, W. J. Mills, Toronto.
2nd. Exclusive, br.g., 15.3, 6 years. Exhibitor, Gordon Grand, East Orange, N.J.

HUNTERS AND JUMPERS.

A horse to be eligible for the qualified hunters' classes must have been regularly hunted with a recognized pack of hounds for more than one season and within a year from date of entry, or have won a first or second prize at a recognized horse show or exhibition. For the purposes of this show a green hunter is one which has not been hunted more than one season, and has never won a first or second prize in hunting or jumping classes at a recognized horse show or exhibition. Certificates must be furnished if required.

QUALIFIED HUNTERS (HEAVYWEIGHT), UP TO CARRYING 180 POUNDS.

Conformation and quality to count 60 per cent., performances over fences to count 40 per cent. A horse taking a prize in this class ineligible for lightweight class. To carry at least 168 pounds.

JUDGES—J. N. Scatcherd, Buffalo; Colin Campbell, Montreal.

1st. Lady Rosebery, ch.m., 16, 5 years. Exhibitor, Adam Beck, London.
2nd. Rob Roy, ch.g., 17.1, aged. Exhibitor, Wm. Hendrie, Jr., Hamilton.
3rd. My Lady, b.m., 16, 5 years. Exhibitor, Miss Ottaway, Hamilton.

QUALIFIED HUNTERS (LIGHTWEIGHT), UP TO CARRYING 150 POUNDS TO HOUNDS.

Conformation and quality to count 60 per cent., performances over fences to count 40 per cent. To carry at least 150 pounds.

1st. Victoria, br.m., 15.2, 7 years. Exhibitor, A. R. Curzon, Guelph.
2nd. Molly Morgan, b.m., 15.3, 7 years. Exhibitor, G. Pepper (agent), Toronto.
3rd. Red Oak, b.g., 15.2, 6 years. Exhibitor, W. D. Grand, East Orange, N.J.

GREEN HUNTERS (HEAVYWEIGHT), UP TO CARRYING 180 POUNDS TO HOUNDS.

Conformation and quality to count 60 per cent., performances over fences 40 per cent. A horse taking a a prize in this class ineligible for lightweight class. To carry at least 168 pounds.

1st. Rainbow, ch.g., 15.3, 4 years. Exhibitor, G. Pepper (agent), Toronto.
2nd. Brian Boru, b.g., 16.1, 6 years. Exhibitor, E. Phillips, Toronto.
3rd. Kedar, gr.g., 5 years. Exhibitor, Dr. Andrew Smith, Toronto.

GREEN HUNTERS (LIGHTWEIGHT), UP TO CARRYING 150 POUNDS TO HOUNDS.

Conformation and quality to count 60 per cent., performances over fences to count 40 per cent. To carry at least 150 pounds.

1st. Rainbow, br.g., 15.2, 5 years. Exhibitor, Brock Fuller, Woodstock.
2nd. Queensberry, ch.g., 15.2. Exhibitor, G. Pepper (agent), Toronto.
3rd. Klondike, ch.g., 15.2, 4 years. Exhibitor, G. Pepper (agent), Toronto.

JUMPING—PERFORMANCES OVER FENCES ONLY TO COUNT.

1st. Victoria, br.m., 15.1½, 7 years. Exhibitor, A. R. Curzon, Guelph.
2nd. Red Oak, b.g., 15.2, 6 years. Exhibitor, W. D. Grand, East Orange, N.J.
3rd. Huntsman, ch.g., 16.1, 6 years. Exhibitor, Adam Beck, London.

FOR THE BEST PERFORMANCE OVER SIX JUMPS, 2 AT 4 FT., 2 AT 4 FT. 6 IN., 2 AT 5 FT., CARRYING NOT LESS THAN 140 POUNDS.

1st. Huntsman, ch.g., 16.1, 6 years. Exhibitor, Adam Beck, London.
2nd. Glencoe, ch.g., 15.3, 6 years. Exhibitor, P. A. Manning, Toronto.
3rd. Queensberry, ch.g., 15.2. Exhibitor, G. Pepper (agent), Toronto.

CORINTHIAN CLASS. OPEN TO HUNTERS.

Horses must be ridden by members of some recognized Hunt. Conformation and quality to count 25 per cent., performances over fences to count 75 per cent.

1st. Veto, b.g., 16.1½, 7 years. Exhibitor, Dr. G. A. Peters, Toronto.
2nd. Huntsman, ch.g., 16.1, 6 years. Exhibitor, Adam Beck, London.

ROADSTERS.

(Standard or Non-Standard.)

A roadster, when mature for driving, should not be under 15 hands high. Conformation, style of going, manners, hock and knee action, whether driven with ordinary or heavy shoes to force action, and as the horses are and appear at the time of showing in the ring, will be considered in judging. To be shown in harness to a road wagon.

MARE OR GELDING.

JUDGE—Dr. A. Elliott, St. Catharines.

1st. Nora Belmont, b.m., 16. Exhibitor, D. T. Lowes, Brampton.
2nd. Domain, b.g, 16, 6 years. Exhibitor, E. B. Clancy, Toronto.
3rd. Tom, ch.g., 15.2, 5 years. Exhibitor, R. B. McKellar, Glencoe.

PAIR OF MARES OR GELDINGS.

JUDGE—Dr. Rutherford, M.P.P., Portage la Prairie, Man.

1st. Phil, blk.g., 16, 6 years; Ben, blk.g., 16, 6 years. Exhibitor, W. R. McBryen, Toronto.
2nd. Flora Duval, ch.m., 15.2, 5 years; Lizzie Duval, ch.m., 15-2, 4 years. Exhibitor, Thomas Herron Windham Centre.

PONIES.

PONY IN HARNESS, 14 HANDS AND UNDER.

JUDGE—Major Lessard, Stanley Barracks, Toronto.

1st. Greta, b.m., 4 years. Exhibitor, R. Beith, M.P., Bowmanville.

JUMPING CLASS.

Ponies 13.2 hands and under, ridden by boys not over 14 years of age. Boys employed in or about stables excluded. Performances over fences only to count.

1st. Burns, roan g. Exhibitor, C. A. Burns, Toronto.

2nd. Redney, ch.m., 12, 4 years. Exhibitor, R. J. Fleming, Toronto.

JUMPING CLASS.

Ponies over 13.2 hands and under 14.3 hands. To be ridden by boys. Boys employed in or about stables excluded.

1st. Maud, b.m., 14.2, aged. Exhibitor, G. Pepper (agent), Toronto.

2nd. Reindeer, br.g. 14.3, 4 years. Exhibitor, S. B. Fuller, Woodstock.

SPECIAL CLASSES.

BEST AND BEST APPOINTED PAIR OF HORSES TO CAB AS LET FOR HIRE, AND ABSOLUTELY USED FOR LIVERY WORK.

To be the bona fide property of owner one month before date of show. Horses to count 60 per cent., cab and appointments 40 per cent.

JUDGES—J. N. Scatcherd, Seward Cary, Harry Hamlin, Buffalo, N.Y.

1st. P. Maher, 19 Bloor street east, Toronto.

MARE OR GELDING.

To be shown in single harness and delivery wagon actually as used in local deliveries. Horse to count 50 per cent., wagon and equipment 50 per cent. Horse to have been owned and actually used in delivery by exhibitor two months before date of exhibition.

1st. Net, b.m., aged. Exhibitor, Copland Brewing Co., Toronto.

BEST PERFORMANCE OF PROFESSIONAL PRIVATE COACHMAN IN LIVERY, WITH PAIR AND CARRIAGE, TO LANDAU, BROUGHAM OR HEAVY VICTORIA.

1st. James Morton, Coachman for George Gooderham, Toronto.

2nd. Walter Budd, Coachman for A. E. Gooderham, Toronto.

BEST DRIVING BY GENTLEMAN, PRIZE IN PLATE.

1st. Dr. Peters, Toronto.

EXTRA CLASSES.

HUNTING TANDEM.

The leader to be a qualified hunter under the rules of the Canadian Hunt Association. To be shown first as a tandem in harness before appropriate vehicle, the leader then to be shown over the regulation jumps. To be driven and ridden by the same gentleman, who must hold certificate from Canadian Hunt Association. Conformation and quality of tandem to count 50 per cent., performance of leader to count 50 per cent. Manners in both styles of competition to be specially considered.

JUDGES—J. N. Scatcherd, Seward Cary,

1st. Adam Beck, London

2nd. Dr. G. A. Peters, Toronto.

HUNT CLUB TEAMS

Of three hunters from any recognized hunt, qualified under rules of Canadian Hunt Association, and to be ridden in hunt colors by gentlemen registered with that Association. Performance over regulation fences to count 50 per cent., conformation 50 per cent.

1st. Toronto Hunt Club, Toronto.

2nd. London Hunt Club, London.

3rd. Hamilton Hunt Club, Hamilton.

A PUBLIC MEETING

Will be held in Brantford on the evening of November 30th, 1898. The Chair will be taken by Hon. A. S. Hardy, and other notable speakers will be present.

ANNUAL MEETINGS.

The following Annual Meetings will be held in Brantford during the time of the Show :

THE AMERICAN OXFORD DOWN RECORD ASSOCIATION,

On the afternoon of November 30th. W. A. Shafstr, Secretary, Middletown, Ohio.

THE AMERICAN LEICESTER BREEDERS' ASSOCIATION,

On the evening of December 1st. A. J. Temple, Secretary, Cameron, Ill.

THE DOMINION SWINE BREEDERS' ASSOCIATION,

On the evening of December 2nd. F. W. Hodson, Secretary, Parliament Buildings Toronto.

THE HEREFORD BREEDERS' ASSOCIATION

At the Kirby House, Brantford, on December 1st., at 11 A.M. Henry Wade, Secretary, Toronto.

THE SHORTHORN BREEDERS' ASSOCIATION,

At Toronto, on February 8th., 1899.

THE AYRSHIRE BREEDERS' ASSOCIATION,

At Montreal, in February, 1899.

THE CLYDESDALE HORSE ASSOCIATION,

At Toronto, on February 9th., 1899.

THE SHIRE HORSE ASSOCIATION,

At Toronto, on February 9th., 1899.

THE CANADIAN HORSE BREEDERS' ASSOCIATION,

At Toronto, on February 9th., 1899.

THE DOMINION CATTLE BREEDERS' ASSOCIATION,

Palmer House, Toronto, at 1 p.m., February 9th, 1899.

THE DOMINION SHEEP BREEDERS' ASSOCIATION,

Palmer House, Toronto, at 1 p.m., February 10th, 1899.

FIFTEENTH ANNUAL

ONTARIO PROVINCIAL

Fat Stock

. . and . .

Dairy Show

TO BE HELD IN THE

CITY OF BRANTFORD

. . ON . .

Nov. 30th and Dec. 1st and 2nd, 1898.

OVER $4,000 CASH PRIZES

Are offered in the Live Stock and Dairy Departments.

REDUCED RATES ON ALL RAILROADS.

Prize Lists and Entry Forms may be had by applying to

F. W. HODSON,
Secretary-Treasurer,
Parliament Buildings, Toronto.

REPORT

OF THE

SUPERINTENDENT

OF

FARMERS' INSTITUTES

OF THE

PROVINCE OF ONTARIO.

1897-8.

(*PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.*)

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CONTENTS.

PAGE

ANNUAL REPORT OF THE SUPERINTENDENT.

Institute Officers for 1898-9 .... x.
Reports of Farmers' Institutes for the Year Ending June 30th, 1898 .... xiv.
Meetings of Institutes .... xviii.
Report of Saltfleet Women's Institute .... xviii.
Constitution and By-Laws .... xx.
A Step in the Right Direction : Mrs. A. Hoodless .... xxii.
Women make a Departure : *Sentinel Review* .... xxiii.

SELECTED PAPERS READ AT MEETINGS.

Agricultural Education Department :
Notes on the Agricultural College, Guelph 3
The Relation of Agriculture to our School System : C. C. James 4
Agriculture in Ontario Public Schools : Wm. Houston 11
Agricultural Education : G. A. Brodie 12
Why Botany should be Taught in Public Schools : Alice Hollingworth 15

Agricultural Department :
Seed Selection : C. A. Zavitz 17
The Cross-breeding and Hybridizing of Plants : W. T. Macoun 31
Parasitic Fungi : J. Dearness 35
The Farm a Source of Income : I. P. Roberts 39
Enlarging the Farm : 47
How to Restore and Maintain Soil Fertility : Wm. Rennie 49
How to keep up the Fertility of the Soil : John Clarkson 50
Our Method of Raising Cabbage for Green Feed : T. D. McCallum 52
Making Plant Food Available : G. E. Day 52
Value of Humus in the Soil : A. C. Wilson 57
Preservation and Control of Soil Moisture : Joseph Conn 58
Surface Cultivation : Joseph E. Gould 60
The Cultivation of the Soil : G. C. Caston 60
Cultivation of the Soil for Corn and Grain Crops : Thos. McMillan 63
The Canning Factory in Relation to the Farmer : J. F. Taylor 65
The Introduction of Economic Plants : Wm. Brodie 66
Growing Potatoes and Preventing Diseases : Alfred Brown 69
Growing Corn, Sunflowers and Horse Beans for the Silo : John Fixter 71
Growing Sunflowers : J. E. Gould 74
Growing Sunflowers for the Silo : D. M. Macpherson 75
How to make good Silage : J. E. Gould 75
Fodder Corn and the Silo : Jacob Bray 76
Cultivation for Corn and Field Roots ; Simpson Rennie 79
Making, Saving and Applying Stable Manure : M. Richardson 81
Manures and Manuring : T. H. Mason 83
Noxious Weeds and Methods of Destroying them : Wm. Fairweather 84

Agricultural Department.—*Continued:* PAGE

Weeds on the Farm: H. Glendinning 86
Tree Planting on the Farm: Phillips Thompson 88
Lucerne or Alfalfa: A. E. Elford 93
Raising Clover for Profit: W. W. Scott 95
Improved Agriculture: E. W. Rathbun 96
An Improved Condition; Transportation; Choice of Crops; Honesty the Best Policy; Imperial Unity: W. E. O'Brien 99
Concrete Floors: A. McNeill 101
Fencing: W. M. Grant 103
Home-made Lightning Rods: Thos. Baty 104
Business Methods in Farming: L. Stauffer 107
Underdraining: A. W. Peart 108
Tobacco Culture: L. C. Palmer 110
Pioneering in Dryden: G. M. Yeomans 115
Farming in Muskoka, its Past, Present and Future: Alice Hollingworth 117

Live Stock Department:

Corncobs of Value as Food: W. A. Henry 121
British Horses in America: Alex. Galbraith 123
The Mare and Her Foal: J. H. Reed 126
The Horse—How to Feed and Drive him: W. R. Swains 127
Breeding and Care of Heavy Horses: Wm. Smith 128
Marketing and Breeding Horses: C. D. Wagar 129
The Cow and her Care: Mrs. E. M. Jones 131
Rearing and Feeding Calves for Breeding purposes: A. C. Hallman 135
Breeding and Feeding Beef Cattle: W. C. McGregor 137
Making Meat in Competition with the West: J. S. Woodward 138
Cattle Feeding: J. R. Snyder 140
Live Stock Breeding: Wm. Linton 141
Tuberculosis: David McCrae 142
Tuberculosis in Animals and its Relation to Consumption in Man: Wm. Gibb 148
Judging Sheep: John A. Craig 152
Sheep on the Farm: D. G. Hanmer 161
Sheep Breeding and the Care of Sheep: Valentine Ficht 162
The Flock on the Farm: John LeBoutellier 163
Care of Lambs: J. B. Ewing 164
Sheep Breeding and Feeding: C. N. Christner 165
Swine Husbandry: Theodore Louis 166
Swine Breeding: T. G. Raynor 170
Breeding and Feeding Hogs for Market: John McMillan 171
Keeping Hogs for Profit: A. P. Ketchen 173
Selection and Care of the Brood Sow and Young Pigs: R. Honey 176
The Production of Pork: D. C. Anderson 177
The Bacon Industry: A. C. Hallman 180
The Bacon Hog: Thos. S. Henderson 183
Swine Breeding and Feeding: Robert Thompson 185
Swine Breeding and Feeding: John C. Nichol 186

DAIRY DEPARTMENT : PAGE

A Dairy Education : H. H. DEAN 190
What a Dairy School Course Means : BELLA MILLER 192
Notes from the Dairy Department of the O. A. C. : H. H. DEAN 194
Utensils and Appliances for use in a Farm Dairy : T. C. ROGERS 195
Pasteurizing Milk and Cream : W. J. PALMER 202
Profitable Dairying : JAMES STONEHOUSE 203
What the Dairy Industry has done for Canada : A. F. McLAREN 207
Home Butter Making : J. J. FERGUSON 211
Home Dairies : THOMAS SCOTT 214
Dairying as a Factor in the Advancement of Soil Fertility : C. M. MACFIE 215
Care of Milk by Patrons : J. H. SCOTT 218
Feeding Dairy Cows : R. S. STEVENSON 219
Feeding and Care of Milch Cows : JOHN ROBERTSON 221
The Curing of Cheese : H. H. DEAN 222
Economical Production of Milk : J. S. WOODWARD 224
The Special Purpose Cow : JUSTUS COHOE 229

HORTICULTURAL DEPARTMENT :

Spraying an Apple Orchard : J. E. ORR 230
The Effect Spraying has on Bees : R. F. HOLTERMANN 233
Ornamental Trees and Shrubs for the Farm : W. W. HILBORN 233
New Markets for our Fruits : L. WOOLVERTON 235
The Planting and Care of the Orchard : JAMES O'REILLY 236
The Cultivation of the Apple from the Seed to the Fruit : W. M. ROBSON 238
The Farmer's Garden : J. W. RICHARDSON 240
Plum Culture : J. M. McAINSH 242
The Cultivation of the Strawberry : W. L. DIXON 243

POULTRY DEPARTMENT :

Poultry Pointers for the Farmer : R. H. ESSEX 245
Practical Poultry-keeping : A. G. GILBERT 247
Raising Poultry Artificially : W. R. GRAHAM 248
Practical Poultry-keeping : C. W. YOUNG 250
General Care of Poultry : G. F. HAYWARD 251
Poultry-keeping as an Aid to Farming : WALTER PHELPS 253
A Few Hints on Making Poultry more Profitable : D. C. TREW 254
Pekin Ducks ; Management of Geese ; Management of Turkeys : J. E. MEYER .. 256

HOME AND HOUSEHOLD DEPARTMENT :

Organization in the Rural Districts : Mrs. HOODLESS 261
Women's Institutes : LAURA ROSE 262
The Importance of Developing a Healthy Social and Intellectual Life : J. I. HOBSON 264
A Common Sense Talk to Young Farmers and their Wives : Mrs. J. L. SMITH 266
Economic Housekeeping : LAURA ROSE 270
A Talk on Domestic Economy : Mrs. J. L SMITH 272
Economic Housekeeping on the Farm : Mrs. R. ROGERS 276
Economy in the Home : Maggie E. NASH 278
Pin Money on the Farm : Mrs. R. ROGERS 279

HOME AND HOUSEHOLD DEPARTMENT.—*Continued.* PAGE

Woman's Duties and Possibilities : Mrs. F. M. Carpenter 281
Bread Making : Laura Rose 283
Sanitation in Rural Districts 284
Ventilation of the Home : Evelyn S. Pettit 290
Selection of a Home : A. J. Reynolds 292
Farm Life as a School of True Manhood : W. A. McCallum 293
Our Social and National Life : W. G. Smyth 295
How to make Home Attractive : D. Lawrence 298
How to make a Country Home Attractive : James Tolton 299
The Ideal Farmer : J. M. Kaiser 300
Sowing and Reaping : Edgar M. Zavitz 302
The Cultivation of Flowers in Open Air : James E. Orr 303

FISH CULTURE DEPARTMENT :

The Farmer as a Trout Breeder : W. C. Harris 305
Trout Culture : C. H. Riggs 308

ENTOMOLOGICAL DEPARTMENT :

Insects in Relation to the Farmer and Fruit Grower : Martin Burrell 310
Insect Life in Relation to the Farm : Wm. Lochhead 313
Success in Beekeeping : R. F. Holtermann 315

ORNITHOLOGICAL DEPARTMENT :

Birds in Relation to Agriculture : Chas. W. Nash 317
Act for the Protection of Insectivorous and other Birds 340
To the Country School Children : Joseph Bawden 341
Birds in Relation to Agriculture : Martin Burrell 342
The Relations of Bird Life to Agriculture : Joseph Bawden 347

GOOD ROADS DEPARTMENT :

Road Reform : A. W. Campbell 349
The Good Road Movement : James Sheppard 354
The Statute Labor Question : M. M. Neilson 355

INDIAN DEPARTMENT :

Addresses by Chiefs A. G. Smith and Josiah Hill 356

REPORTS FROM EUROPEAN AND AMERICAN EXPERIMENT STATIONS.

EUROPEAN EXPERIMENTS 358
Dairying, 358—Field Crops, 360—Orchards, 363—Veterinary, 363.

AMERICAN EXPERIMENTS 367
Dairying, 366—Field Crops, 372—Good Roads, 378—Fertilizers, 378—Horticulture, 382- Diseases, 384—Entomology, 387—Feeds and Feeding, 389—Veterinary Science, 395—Seeds, 398.

AMERICAN EXPERIMENT STATIONS 399
Storrs Agricultural, 399—North Dakota, 402—Illinois, 407—Kansas, 409—Maine, 410—Michigan, 415—Hatch (Mass.) 417,—New Jersey, 422—Nebraska, 424—Ohio, 429—Rhode Island, 431—Washington, 434.

INDEX 437

FOURTH ANNUAL REPORT

OF THE

SUPERINTENDENT OF FARMERS' INSTITUTES

OF

ONTARIO

FOR THE YEAR 1897-8.

To the Honorable Minister of Agriculture :

I have the honor to submit herewith my fourth Annual Report as Superintendent of Farmers' Institutes.

Your obedient servant,

F. W. HODSON.

FARMERS' INSTITUTES OF ONTARIO.

ANNUAL REPORT OF THE SUPERINTENDENT.

The political campaign which commenced in February and ended early in March, 1898, interfered considerably with the work of the Farmers' Institutes. The public mind became so engrossed with politics that it was deemed prudent to cancel all meetings advertised to be held after the 19th of February. This caused a loss of membership and a reduction in the number of meetings held. Nevertheless the year ending June 30th, 1898, was the most successful in the history of the Farmers' Institutes in Ontario. The total membership on the 31st of December, 1897, was 15,707 ; on the 31st of July, 1898, it was 16,351. When it is remembered that all memberships are cancelled on the 31st of December each year, and that the present membership of over 16,000 has been sent in by the secretaries since the 1st of January, 1898, the growth must be considered satisfactory. It is quite safe to predict a membership of 20,000 before the end of 1899.

During the past year 658 meetings were held, 3,270 addresses delivered, and 126-094 persons attended the meetings—nearly 1,000 more than in the previous year ; but for the political campaign the attendance would probably have reached 130,000. In addition to this work many of the Institutes conducted excursions to the College Farm at Guelph, where upwards of 30,000 persons spent a profitable time inspecting the crops and stock, enquiring into the success or otherwise of experiments, and listening to addresses and explanations given by the various professors and teachers. Negotiations are now being conducted with the railway companies in order that this work may be systematized, and that all local Institutes may be treated similarly by the railway officials, and that the work of arranging the excursions may be lessened.

Meetings for 1898-99. The meetings announced in the special bulletin numbered 516. It has been found impossible to grant all the meetings asked for by the local officers, but the utmost has been done to meet their wishes in this respect.

The Delegates. This is the first season, since the establishment of Farmers' Institutes in Ontario, that the staff of the Ontario Agricultural College has not been employed as delegates. Recently the college year was so changed that the services of these gentlemen will not, hereafter, be available for Farmers' Institute work during December, January or February, but will be during the month of June. The change in the college year, though not an advantage to the Institute system, will prove a decided benefit to the college and the students

Each of the persons employed as a delegate is practical and successful in his or her respective department. If the delegates sent to any Institute are unable to discuss topics which the local officers think should be taken up, said officers should employ additional speakers, either from the reserve list or elsewhere.

Local Institutes. The Act and Rules Governing Farmers' Institutes are in the hands of each secretary and officer, and each Institute is expected to conform to the Act. The most successful Institutes are those which have most closely followed the instructions.

Of a few districts the complaint has been made by delegates and others that the meetings were not properly advertised or the halls prepared to receive the audience. The officers of such Institutes have been warned that speakers will not be sent where slipshod methods prevail. The demand for meetings and delegates is so great that it is now found impossible to hold as many meetings as are asked for by local officers who enthusiastically do their part to the very letter. Therefore, in justice to these districts, delegates will not hereafter be sent to Institutes where the local officers will not do their part.

Institute officers should hold meetings of farmers and business men, at points where meetings are to be held, at least four weeks before the said meeting convenes, for the purpose of engaging the hall and providing an evening programme; also to secure some of the best farmers to read papers on branches of farming in which they excel, and two or three ladies to give papers on some phases of home life or domestic economy.

Let it constantly be borne in mind that one of the chief aims of the Institute work is the development of local talent, and the bringing of the rank and file into close touch with the most successful local men and their methods. Do not depend altogether on the delegates; if home talent is not developed the chief benefit of the Institute system is lost sight of.

This is the first year that an Indian Department has appeared in the report of the Superintendent of Farmers' Institutes. The commencement is small, but we hope that it will grow. Where reservations are located we trust that the officers of Institutes will do all in their power to assist our red brethren as much as possible to keep pace with the advance in agriculture.

INSTITUTE OFFICERS FOR 1898-9.

Addington.—President, Adam Gilmore, Tamworth; Vice-President, M. Shannon, Centreville; Secretary, J. B. Aylesworth, Newburgh.

Algoma C.—President, Henry Knight, Sault Ste. Marie; Vice-President, G. H. Farmer, Sault Ste. Marie; Secretary, A. W. Penhorwood, Sault Ste. Marie.

Algoma E.—President, James Lochore, Thompson; Vice-President, Thomas Cordukes, Sowerby; Secretary, John H. Elliott, Day Mills.

Amhesrt Island.—President, Henry Filson, Stella; Vice-President, Wm. Allen, Stella; Secretary, T. J. Polley, Stella.

Brant N.—President, H. R. Nixon, St. George; Vice-President, A. W. Vansickle, Onondaga; Secretary, Cyrus Griffith, St. George.

Brant S.—President, D. G. Hammer, Burford; Vice-President, W. H. Lewis, Burford; Secretary, W. H. Metcalf, Burford.

Brockville.—President, Wm. Neilson, Lyn; Vice-President, G. A. Gilroy, Glen Buell; Secretary, R. H. Fields, Addison.

Bruce C.—President, D. N. McIntrye, Paisley; Vice-President, R. H. Rowan, Glammis; Secretary, O. H. Nelson, Paisley.

Bruce N.—President, Cecil Swale, Wiarton; Vice-President, John Heath, Hope Bay; Secretary, Peter Anderson, Hepworth.

Bruce S.—President, Henry Arkell, Teeswater; Vice-President, A. E. Sherrington, Walkerton; Secretary, Jas. A. Lamb, Walkerton.

Bruce W.—President, Alfred Brunton, Tara; Vice-President, John George, Port Elgin; Secretary, John Douglas, Tara.

Carleton.—President, J. G. Clark, Ottawa; Vice-President, John Craig, North Gower; Secretary, R. H. Grant, Hazeldean.

Cornwall.—President, James McLeod, South Branch; Vice-President, Sol. Raymond, Moulinette; Secretary C. W. Young, Cornwall.

Dufferin.—President, W. J. Craven, Shelburne; Vice-President, W. J. Black, Stanton; Secretary, Wm. Hudd, Horning's Mills.

Dundas.—President, A. Kennedy, Winchester; Vice-President, F. E. Farlinger, Morrisburg; Secretary, J. P. Fox, Winchester.

Durham E.—President, Robert Vance, Ida; Vice-President, T. A. Kelley; Secretary, W. Vance, Millbrook.

Durham W.—President, Jas. Gale, Bowmanville; Vice-President, M. A. James, Bowmanville; Secretary, H. C. Hoar, Bowmanville.

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ELGIN W.—President, A. S. Backus, Tyrconnell ; Vice-President, Edgar Silcox, Shedden ; Secretary, Arch. McColl, Aldboro.

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ESSEX S.—President, J. C. Shepley, Kingsville ; Vice-President, Isaac A. Wigle, Ruthven ; Secretary, G. W. Coatsworth, Kingsville.

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GLENGARRY.—President, Wm. Wightman, Lancaster ; Vice-President, M. A. Monro, Glen Roy ; Secretary, W. J. McNaughton, Lancaster.

GRENVILLE S.—President, Robert Alder, Prescott : Vice-President, Thos. J. Millar, Spencerville ; Secretary, Jas. Bennett, Spencerville.

GREY C.—President, John Irwin, Red Wing ; Vice-President, J. M. Davis, Vandeleur ; Secretary, J. I. Graham, Vandeleur.

GREY N.—President, Malcolm Rutherford, Leith. Vice-President, W. S. Saunders, Owen Sound ; Secretary, James Smith, Inglis Falls.

GREY S.—President, W. J. Young, Durham ; Vice-President, Robt. Morice, Orchard ; Secretary, Geo. Binnie, Bunessan.

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HURON S.—President, D. McInnis, Thames Road ; Vice-President, R. B. McLean, Kippen ; Secretary, R. Gardiner, Farquhar.

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York W.—President, A. T. Orthe, Kleinburg ; Vice-President, John Goulding, Downsview ; Secretary, R. L. Crawford, Maple.

REPORT OF FARMERS' INSTITUTES

Institute District.	Membership, December, 1897.	Membership to July, 1898.	No. of meetings held.	Total Attendance.	No. of papers read or addresses delivered.	Receipts.					
						Cash on hand per last report.	Members' Fees.	Donations.	Grants.	Receipts from conventions.	Receipts from excursions.
						$ c.	$ c.	$ c.	$ c.	$ c.	
Addington	51	69	6	614	30	22 65	12 75	......	50 00	......	......
Algoma, Centre	115	153	5	235	12	28 08	38 00	......	50 00	......	......
Algoma, East	......	71	*1	25	......	......	......	......	......	......	......
Amberst Island	67	50	4	281	7	1 02	12 50	......	50 00	......	......
Brant, North	122	142	9	2,269	45	2 10	35 25	......	50 00	......	......
Brant, South	64	115	5	1,210	31	22 65	30 75	......	50 00	......	7 90
Brockville	115	152	6	1,560	28	25 67	38 00	......	25 00	......	......
Bruce, Centre	151	116	6	1,130	21	31 82	29 00	......	50 00	......	......
Bruce, N	62	92	6	525	10	7 68	13 50	......	75 00	......	......
Bruce, S	125	125	5	1,315	27	101 53	23 50	......	50 00	......	......
Bruce, W	154	234	13	2,636	59	121 77	58 00	......	50 00	......	......
Carleton	107	118	5	1,013	32	......	27 25	......	50 00	......	......
Cornwall	98	73	5	681	28	24 87	18 50	12 50	37 50	......	......
Dufferin	112	120	6	768	34	117 13	28 50	......	25 55	......	......
Dundas	290	221	5	1,759	36	69 35	54 75	......	50 00	......	......
Durham, E	122	125	6	1,070	15	38 75	35 25	......	50 00	......	......
Durham, W	168	188	10	1,023	30	87 05	44 97	......	50 00	......	......
†Elgin, E	235	118	....	....	...	72 50	28 50	......	50 00	......	......
Elgin, W	193	173	7	1,020	30	17	23 25	......	50 00	......	......
Essex, N	94	67	5	1,115	27	45 67	15 25	......	50 00	......	......
Essex, S	157	156	7	1,155	39	159 94	39 25	......	50 00	......	......
Frontenac	142	102	6	660	25	30 58	27 25	......	50 00	......	......
Glengarry	200	196	7	1,970	37	......	48 25	......	50 00	......	......
Grenville, S	127	106	5	1,286	31	81 52	26 50	......	25 00	......	......
Grey, Centre	142	189	7	1,571	55	27 49	48 00	......	75 00	......	......
Grey, N	312	285	14	1,413	56	50 81	75 75	......	50 00	......	......
Grey, S	109	184	4	1,365	23	162 28	47 25	......	50 00	25 60	......
Haldimand	201	235	7	1,170	36	107 32	57 00	......	50 00	......	183 20
Halton	282	332	6	2,305	32	165 20	82 25	......	50 00	......	80 00
Hastings, E	126	143	5	1,005	34	24 73	34 75	......	50 00	......	....
Hastings, N	412	514	20	2,340	77	49 16	119 00	......	50 00	......	......
Hastings, W	135	142	5	1,320	22	70 16	35 50	......	50 00	......	......
Huron, E.	176	198	7	1,597	37	69 14	48 00	......	50 00	......	......
Huron, S	143	138	6	2,275	27	130 02	34 25	......	50 00	......	......
Huron, W	132	341	11	2,488	50	63 44	55 00	......	50 00	......	63 00
Kent, E	242	226	7	1,245	28	......	53 50	......	50 00	......	......
Kent, W	206	119	5	643	26	138 41	29 00	......	25 00	......	......
Lambton, E	186	194	13	1,188	59	45 85	35 50	......	50 00	......	......
Lambton, W	210	78	3	240	17	......	20 00	5 00	50 00	......	......
Lanark, N.	391	278	7	1,270	20	......	69 50	......	65 00	31 25	......
Lanark, S	255	187	8	2,265	41	16 34	50 00	......	65 00	......	......
Leeds, N. and Grenville, N	126	130	9	2,079	56	33 97	30 75	......	25 00	......	95 50
Leeds, S	204	196	6	1,910	39	......	49 25	......	50 00	......	......
Lennox	65	103	8	1,034	17	79 47	26 00	......	50 00	......	......
Lincoln	139	163	6	1,335	37	5 60	34 75	......	55 00	...	......
Manitoulin, E	122	91	8	925	16	50 75	21 00	......	25 00	......	......
Manitoulin, W	55	78	7	438	17	1 47	19 00	......	25 00	......	......
Middlesex, E	361	230	9	1,920	54	112 16	62 25	...	25 00	......	64 70
Middlesex, N	374	340	12	2,970	101	158 03	85 00	......	25 00	......	97 15
Middlesex, W	227	204	8	1,300	41	89 33	51 00	......	25 00	......	......
Monck	131	153	6	627	22	71 92	38 25	......	55 00	......	......
Muskoka Centre	60	53	5	233	14	20 18	13 25	......	25 00	......	......
Port Carling	27	32	5	488	12	9 40	7 75	......	....	...	......
Muskoka, N	139	186	7	606	36	......	34 75	......	25 00	......	......
Muskoka, S	67	63	5	265	18	39 75	15 75	....	25 00	......	......

* Organization meeting.

FOR YEAR ENDING JUNE 30TH, 1898.

Receipts.—*Con.*			Expenditure.											
Miscellaneous.	Ballance due treasurer.	Total receipts.	Due treasurer pe last report.	Expense for meetings.	Secretary's salary, etc.	Postage and stationery.	Printing.	Advertising.	Lecturers' expenses.	Lecturers' allowance.	Periodicals for members.	Miscellaneous.	Balance on hand.	Total.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
......	......	85 40	......	27 95	20 00	7 04	10 00	2 00	......	......	......	4 50	13 91	85 40
......	......	116 08	......	......	14 57	12 49	2 50	...	......	......	......	8 00	78 52	116 08
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
41 00	......	104 52	......	6 50	..	2 25	4 75	1 35	....	......	......	51 80	37 87	104 52
......	......	95 25	......	35 00	5 00	5 33	13 25	......	6 60	......	4 00	26 07	...	95 25
......	......	103 40	......	13 40	25 00	3 03	7 50	......	11 95	......	......	3 77	38 75	103 40
......	......	88 67	......	16 50	15 00	.....	2 25	8 60	12 95	......	......	......	33 37	88 67
......	......	110 82	......	26 85	15 00	1 00	14 40	......	10 11	......	......	1 35	42 11	110 82
......	......	96 18	......	4 95	5 00	2 65	11 50	......	7 60	......	......	......	64 48	96 18
1 00	......	176 03	......	16 75	30 65	8 20	14 00	..	14 02	......	......	2 00	90 41	176 03
......	......	229 77	......	88 63	26 30	5 89	18 90	3 30	10 40	......	25 35	7 30	43 70	229 77
......	......	77 25	4 62	9 90	25 00	4 67	15 80	......	......	......	......	25	17 01	77 25
......	......	93 37	......	18 35	25 00	3 00	18 25	2 00	9 50	......	......	5 75	11 52	93 37
3 35	......	173 98	......	21 25	15 00	6 12	......	11 83	4 75	10 00	......	14 25	90 78	173 98
......	......	174 10	......	12 50	30 00	5 39	13 75	17 25	11 05	......	......	25	83 91	174 10
......	......	124 00	......	34 20	25 00	6 75	13 25	......	......	......	......	......	44 80	124 00
42	......	182 44	......	8 75	15 00	15	....	47 03	22 50	4 00	......	6 65	78 36	182 44
......	......	151 00	......	12 38	22 00	3 43	26 75	......	......	......	......	1 00	85 44	151 00
......	......	93 42	......	17 85	25 00	12 65	9 50	4 88	11 90	......	......	15	11 49	93 42
......	......	110 92	......	1 50	15 00	5 78	10 00	......	24 45	9 35	......	35	44 49	110 92
......	......	249 19	......	15 00	45 00	3 70	18 95	......	25 65	......	......	5 25	135 64	249 19
......	......	107 83	......	4 50	20 00	7 64	17 00	26 55	12 25	......	......	......	19 89	107 83
......	37 18	135 43	21 79	42 35	25 00	1 50	3 00	25 19	16 10	......	......	50	......	135 43
......	......	133 02	......	6 00	20 00	3 23	......	10 25	19 45	......	......	15 15	58 94	133 02
9 00	......	159 49	......	43 15	22 65	9 08	19 75	3 00	14 50	......	......	1 30	46 06	159 49
......	......	176 56	......	47 65	41 75	17 53	11 90	10 50	25 00	......	......	2 10	20 13	176 56
......	......	285 13	....	42 75	33 80	6 12	9 00	50	9 43	......	24 50	......	159 03	285 13
3 00	......	400 52	......	5 50	30 00	28 36	41 00	......	8 54	......	....	44 34	242 78	400 52
......	......	377 45	......	47 05	49 35	4 54	40 51	1 50	15 15	......	31 65	25	187 45	377 45
......	......	109 48	......	7 00	25 00	12 70	20 50	7 50	11 80	......	......	5 50	19 48	109 48
......	......	218 16	......	34 20	60 00	11 09	33 32	......	64 30	......	......	2 55	12 70	218 16
......	......	155 66	......	33 00	15 00	4 95	10 75	......	6 75	......	......	......	82 21	155 66
1 10	......	168 24	......	36 20	33 80	6 78	11 71	4 00	12 05	......	......	4 70	59 00	168 24
......	......	214 27	......	28 40	10 00	5 00	7 25	14 10	16 55	......	......	7 45	125 52	214 27
......	......	231 44	......	17 75	49 00	16 36	21 75	......	41 91	......	......	5 77	78 90	231 44
......	8 01	111 51	6 37	11 50	20 00	20 69	8 75	16 50	19 30	......	......	8 40	......	111 51
......	......	190 41	......	15 35	25 00	37 61	......	......	12 80	......	......	......	99 65	190 41
......	......	131 25	......	24 10	24 75	7 89	13 00	.....	33 60	......	......	......	28 01	131 35
50	......	75 50	2 72	9 00	35 00	5 00	20 00	1 84	...	......	......	......	1 94	75 50
......	......	165 75	19 97	28 50	32 00	2 53	1 00	21 50	30 60	......	......	2 35	27 30	165 75
......	......	131 34	......	54 70	20 00	7 98	31 90	....	12 00	......	......	......	4 76	131 34
......	.. ..	185 22	......	40 35	......	3 50	30 95	2 50	23 52	.. ..	......	62 10	22 30	185 22
......	4 99	104 24	8 60	38 00	15 00	4 25	12 50	1 50	23 89	......	......	50	......	104 24
......	......	155 47	......	46 50	15 00	......	6 25	......	......	......	......	......	87 72	155 47
......	......	95 35	......	7 00	30 00	5 65	13 25	19 00	6 17	......	......	......	14 28	95 35
......	......	96 75	......	2 35	12 00	3 00	9 05	......	18 00	......	......	1 00	51 35	96 75
......	......	45 47	......	......	10 00	1 98	.	......	16 00	......	......	1 01	16 48	45 47
4 99	......	269 10	......	43 25	21 00	10 70	22 00	17 62	33 00	......	......	8 20	113 33	269 10
7 75	......	372 93	......	36 65	45 00	10 45	23 26	......	25 95	......	......	18 50	213 12	372 93
......	......	165 33	......	20 65	31 00	2 45	8 75	3 00	12 50	26 93	......	......	60 05	165 33
......	......	165 17	......	22 30	28 30	6 37	14 45	10 75	21 26	......	......	5 60	56 14	165 17
1 75	..	60 18	......	2 55	17 00	6 68	2 75	......	4 75	......	......	4 30	22 15	60 18
......	3 64	20 79	......	4 74	5 00	3 75	4 75	.....	......	......	......	2 55	......	20 79
......	15 73	75 48	......	17 35	24 10	5 19	9 25	25	......	......	......	19 34	...	75 48
......	......	80 50	......	......	15 00	1 03	9 50	2 00	......	......	.. ..	6 00	46 97	80 50

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† No annual report received.

REPORT OF LOCAL FARMERS' INSTITUTES

Institute District.	Membership, December, 1897.	Membership to July, 1898.	No. of meetings held.	Total attendance.	No. of papers read or addresses delivered.	Receipts.					
						Cash on hand per last report.	Members' fees.	Donations.	Grants.	Receipts from conventions.	Receipts from excursions.
						$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Norfolk, North	250	253	6	1,420	53	26 96	63 50	......	50 00	......	.....
Norfolk, South	99	105	3	360	12	24 43	25 25	......	50 00	...	......
Northumberland, East	102	193	5	1,910	37	9 94	47 75	......	50 00	101 60	......
Northumberland, West	111	124	5	1,380	13	55 93	31 00	......	50 00	......	......
Ontario, North	371	626	11	1,911	79	63 13	107 25	......	50 00	......	230 60
Ontario, South	329	264	10	1,140	50	33 29	65 75	......	50 00	......	48 25
Oxford, North	161	121	7	1,355	53	13 49	16 00	......	50 00	......	......
Oxford, South	102	173	6	1,305	50	81 77	44 00	......	50 00	......	......
Parry Sound, East	102	107	7	531	26	29 38	25 50	......	25 00	......	......
Parry Sound, West	102	123	6	298	35	2 96	30 75	......	45 00	......	.....
Peel	357	421	9	1,895	62	121 58	105 00	......	50 00	......	110 00
Perth, North	128	187	7	1,845	50	1 04	45 25	......	50 00	......	131 35
Perth, South	174	256	8	1,507	52	6 25	63 50	......	50 00	......	21 75
Peterborough, East	148	150	6	2,380	22	.....	26 75	......	50 00	10 00	......
Peterborough, West	128	142	7	1,800	31	38 70	33 75	......	50 00	......	43 50
Prescott	102	107	5	1,230	25	3 11	26 50	......	50 00	......	......
Prince Edward	262	303	9	1,385	25	110 14	65 50	......	50 00	......	81 85
Renfrew, North	79	97	5	990	11	24 95	23 25	......	50 00	......	......
Renfrew, South	140	120	5	581	22	89 92	30 50	....	50 00	......	......
Russell	54	79	5	1,200	28	52 81	18 50	......	50 00	......	......
Simcoe, Centre	196	156	6	1,066	21	46 24	28 00	......	50 00	.....	146 00
Simcoe, East	235	147	5	2,692	17	21 32	40 75	......	50 00	......	66 40
Simcoe, South	134	105	6	611	34	27 62	24 75	.....	24 75	......	......
Simcoe, West	205	121	6	1,985	44	45 10	35 00	......	25 00	......	189 51
Stormont	124	170	8	1,095	31	......	43 50	......	50 00	......	......
St. Joseph Island	84	92	8	1,790	57	103 89	24 50	......	50 00	.....	......
Victoria, East	119	126	9	164	54	12 58	30 00	......	50 00	21 55	......
Victoria, West	162	135	7	1,917	50	57 80	52 65	......	50 00	......	......
Waterloo, North	147	158	5	1,185	37	72 66	39 00	......	50 00	......	......
Waterloo, South	468	517	14	2,854	85	64 32	128 25	......	50 00	......	129 80
Welland	128	185	11	1,220	55	110 01	43 50	......	50 00	......	......
Wellington, Centre	161	171	6	1,975	42	62 17	78 75	......	75 00	......	......
Wellington, East	169	203	7	1,790	52	......	93 00	......	50 00	......	......
Wellington, South	184	137	7	1,150	9	11 84	30 50	5 00	25 00	......	......
Wellington, West	139	187	5	1,560	30	64 58	54 00	......	50 00	.....	......
Union	96	77	5	870	10	29 64	19 50	......	.....	......	......
Wentworth, North	144	214	6	1,515	33	15 57	52 75	......	50 00	......	.....
Wentworth, South	326	251	7	2,570	45	88 64	58 50	......	50 00	......	42 25
York, East	121	128	12	1 201	32	164 89	18 50	......	50 00	......	13 00
York, North	92	51	5	472	15	55 09	12 00	......	50 00	......	......
York, West	144	182	5	839	27	27 18	34 00	......	50 00	.....	......
Totals	15,707	16,351	658	126,094	3,270	......	......	......	......	......	......

Average attendance at

FOR YEAR ENDING JUNE 30TH, 1898.—*Concluded.*

Receipts.—*Con.*			Expenditure.											
Miscellaneous.	Balance due treasurer.	Total receipts.	Due treasurer per last report.	Expense for meetings.	Secretary's salary, etc.	Postage and stationery.	Printing.	Advertising.	Lecturers' expenses.	Lecturers' allowance.	Periodicals for members.	Miscellaneous.	Balance on hand.	Total.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
....	......	140 46	......	42 50	35 00	11 86	11 50	6 00	19 25	......	. ..	......	14 35	140 46
50	......	100 18	......	4 50	49 80	5 91	23 00	9 50	......	......	......	60	6 87	100 18
......	......	209 29	......	92 75	25 00	6 64	15 50	...	23 10	......	......	10 25	36 05	209 29
2 00	......	138 93	......	43 25	18 00	4 25	7 50	2 25	9 50	......	......	......	54 18	138 93
.....	......	450 98	......	70 45	56 50	16 82	35 66	3 00	34 55	......	.. ...	6 60	227 40	450 98
......	......	197 29	....	10 15	45 20	20 32	23 75	31 25	20 95	......	......	......	45 67	197 29
......	.. ..	79 49	....	9 00	21 00	1 67	22 20	......	10 73	......	......	1 50	13 39	79 49
2 80	. ....	178 57	......	10 50	20 00	4 35	25 70	......	24 50	......	......	4 75	88 77	178 57
.....	......	79 88	......	8 80	15 00	2 25	2 00	6 00	......	.....	......	......	45 83	79 88
......	......	78 71	.....	24 75	19 25	4 25	7 25	......	......	......	......	......	23 21	78 71
3 20	......	389 78	......	37 15	40 00	5 93	......	63 00	49 10	......	22 90	......	171 70	389 78
......	......	227 64	......	19 30	26 44	4 50	15 25	37 00	33 40	12 00	......	11 80	67 95	227 64
......	... ..	141 50	.... .	50 80	20 00	9 75	12 00	14 40	28 55	......	......	1 75	4 25	141 50
......	......	86 75	24 00	14 05	15 00	1 85	15 25	..	......	......	......	10 50	6 10	86 75
6 25	......	172 20	. ....	20 75	21 75	4 00	......	57 20	......	20 00	......	5 00	43 50	172 20
......	......	79 61	......	2 25	20 00	....	8 50	11 55	5 40	8 75	......	4 44	18 72	79 61
7 65	......	315 14	......	25 15	18 90	28 98	......	91 59	26 10	......	26 20	10 60	87 62	315 14
......	.....	98 20	.....	7 30	20 00	4 75	39 25	7 25	......	......	......	......	19 65	98 20
......	. ...	170 42	.....	16 00	25 00	2 38	1 00	15 85	20 30	......	......	15	89 74	170 42
... ..	......	121 31	.....	12 00	30 00	2 00	19 00	......	13 50	......	......	......	44 81	121 31
......	......	270 24	......	15 15	20 00	3 80	25 88	23 25	9 80	......	......	68 15	104 21	270 24
9 50	......	187 97	......	20 50	42 49	3 87	......	44 95	......	......	......	90	75 26	187 97
....	23 32	100 44	......	15 50	30 00	8 29	7 50	.....	30 10	......	.....	9 05	......	100 44
60	......	295 21	......	12 99	39 40	16 62	12 00	3 36	15 55	......	......	103 70	91 59	295 21
......	23 67	117 17	17 72	20 50	43 50	3 20	15 25	3 00	14 00	.. ..	......	......	......	117 17
7 30	......	185 69	......	11 25	10 00	6 84	16 00	......	......	......	37 20	.... .	104 40	185 69
......	......	114 13	......	20 25	20 00	6 92	18 25	......	13 10	.... .	......	7 45	28 16	114 13
......	.....	160 45	.....	24 35	20 00	8 99	29 25	......	3 60	17 60	30 00	. ....	26 66	160 45
......	......	161 66	......	27 50	35 00	6 75	12 00	2 50	1 50	......	......	13 67	62 74	161 66
5 10	....	377 47	.. ...	71 20	70 00	12 02	39 25	1 50	16 45	......	......	5 60	161 45	377 47
......	......	203 51	......	23 70	15 00	2 50	2 50	8 00	14 79	....	......	6 05	130 97	203 51
......	......	215 92	......	66 60	35 40	7 42	23 50	7 25	28 88	......	......	7 70	39 17	215 92
......	......	143 00	7 92	20 70	27 00	3 68	20 84	......	20 70	5 00	14 60	50	22 06	143 00
7 25	11 36	90 95	......	3 52	20 00	4 75	13 50	4 68	......	......	......	44 50	......	90 95
......	......	168 58	......	7 90	15 00	8 70	11 64	1 78	9 95	......	40 00	25	73 36	168 58
......	......	49 14	......	4 15	10 00	1 67	......	11 30	......	......	......	......	22 02	49 19
......	......	118 32	.....	13 50	26 15	5 20	20 00	7 00	12 45	......	......	......	34 02	118 32
......	......	239 39	......	15 50	10 00	13 57	15 00	2 00	23 01	.....	......	5 80	154 51	239 39
......	......	246 39	......	12 50	20 00	18 21	21 75	......	......	......	......	.....	173 93	246 39
......	......	117 09	......	2 00	50 00	98	......	8 40	......	......	......	......	55 71	117 09
......	2 52	113 70	......	11 50	31 50	5 90	25 00	2 00	1 00	.....	......	36 80	......	113 70
......	......	......	......	....	......	......	.....	......	......	......	......	......	......	....

local meetings, 192.

MEETINGS OF INSTITUTES.

The Institutes holding the largest number of meetings were:

Hastings North	20	Welland	11
Grey North	14	Durham West	10
Waterloo South	14	Ontario South	10
Bruce West	13	Brant North	9
Lambton East	13	Leeds North and Grenville North	9
Middlesex North	12	Middlesex East	9
York East	12	Peel	9
Huron West	11	Prince Edward	9
Ontario North	11	Victoria East	9

The Institute meetings which were the most largely attended were:

Institutes	No. of Meetings held	Total Attendance
Middlesex North	12	2,970
Waterloo South	14	2,854
Simcoe East	5	2,692
Bruce West	13	2,636
Wentworth South	7	2,570
Huron West	11	2,488
Peterborough East	6	2 380
Hastings North	20	2,340
Halton	6	2,305
Huron South	6	2,275
Brant North	9	2,269
Lanark South	8	2,265
Victoria East	9	2,164
Leeds North and Grenville North	9	2,079

The Institutes having the largest membership June 30th, 1898, are:

Name of Institute	Number of Members	Name of Institute	Number of Members
Ontario North	626	Huron West	341
Waterloo South	517	Middlesex North	340
Hastings North	514	Halton	332
Peel	421	Prince Edward	303

The Institutes having the smallest membership are:

Name of Institute	Number of Members	Name of Institute	Number of Members
York North	51	Algoma East	71
Muskoka South	63	Cornwall	73
Essex North	67	Manitoulin West	78
Addington	69	Russell	79

REPORT OF THE SALTFLEET WOMEN'S INSTITUTE.

The Women's Institute of Saltfleet has just completed its first full year, and it is with great satisfaction that we report much progress. The membership has increased, the enthusiasm is unabated, and the different members show their interest by their willingness to assist in making the meetings helpful and instructive. Eight regular meetings have been held, the members of the society contributing many valuable papers. The papers given have been so thoroughly prepared, and have brought to light so much latent talent that we are looking forward with great confidence to the coming year. We have recently taken up the Chautauqua course in domestic science in connection with our Institute, having special meetings for readings, of which we have had four. We are already very much interested and from them expect to gain many practical ideas.

The question drawer has proved to be very interesting. The questions create considerable discussion and bring out the experiences of others, which is a source of information to the members.

The meetings are varied by music. readings, recitations, etc. Following is a list of papers given:

"Gleaned Thoughts," by Miss H Corman; "House-keeping *versus* Home-making," by Miss M. McNeilly; "A Talk to the Girls," by Mrs. J. W. Smith; "Floriculture," by Mrs. O. Hill; "The Science of Keeping Clean in the Household," by Mrs. F. M. Carpenter; "Butter-making," by Mrs. Erland Lee; "Fruit as a Food and a Medicine," by Miss A. Hill; "Food Value in Whole Wheat," by Mrs. J. McNeilly; "Sanitary Hints for House-keepers; by Mrs. J. Dean; "Women's Duties and Possibilities," by Mrs. F. M. Carpenter.

At our regular meeting on April 14th, we were honored by a visit from the officers of the newly established Women's Institute, of Ancaster, who were anxious to gain an insight into our methods of working. The Township Council, recognizing the valuable work being done by our Institute, gave us a liberal grant. Two open meetings have been held. The term "Open Meeting" refers to meetings held in the evening to which the gentemen are invited, also the general public, and special talent is engaged. At our open meeting on the 31st of May an interesting lecture, "One Eye on the Field the Other on the Town," was given by Miss Rose of the Dairy Department of the O. A. C., Guelph. Dr Cockburn favored us by giving a medical talk, and J. H. Smith, P.S I., gave an address on women's influence. The annual meeting in June was largely attended. The Secretary and Treasurer's reports were adopted, and thanks expressed to Mrs. Hoodless, our Honorary President, for her assistance in carrying on the work of the Institute. The President, Mrs. E. D. Smith, declined re-election.

The following is a list of officers for the ensuing year:—Honorary President, Mrs. John Hoodless; President, Mrs. Erland Lee; 1st Vice President, Mrs. E. D. Smith; 2nd Vice-President, Mrs. S. Melson; Secretary, Miss M. E. Nash; Treasurer, Mrs. J. H. McNeilly.

We are now merely a women's institute in our infancy, but we hope the day is not far distant when we will be affiliated with the Farmers' Institute and receive the same pecuniary consideration and assistance from the Government which has been so liberally extended to Farmers Institutes.

FINANCIAL STATEMENT FOR YEAR ENDING JUNE, 1898.

RECEIPTS.

1897 Balance	$10 59
Nov. 11, Members fees	1 00
Feb 10, " "	25
April 4, Donation	5 00
April 14, Cakes sold	1 30
Feb. 25, Members fees	25
Apr. 14, " "	50
May 31, " "	8 50
" " Concert and Lecture	27 00
	$54 39

EXPENDITURES.

Nov. 11,	For hall	2 00
" "	Printing	1 25
" "	Decorating and carpet	1 25
" "	R. R. Tickets	1 00
" "	H. G. B. (bills)	10
" "	Postage Sec'y	53
Dec. 2,	Hall	1 00
Feb. 10,	"	2 00
" "	Postage Sec'y	50
Mar. 10,	Hall	50
Apr. 14,	"	1 00
May 12,	"	1 00
Dec. 16,	Dewar's Hall	50
May 31,	Hall	3 00
	Orchestra	4 00
	Miss Awrey	5 00
	Bills and Tickets	2 50
	Comp. R. "	1 80
	Hall	1 00
	Books	5 00
	Correspondence	20
	Sec'y duty and postage	1 31
	Balance	17 95
		$54 39

MRS. MELSON, }
MISS ORR, } Auditors.

N. MCNEILLY,
Treasurer.

CONSTITUTION AND BY-LAWS OF WOMEN'S INSTITUTE, SALTFLEET.

Adopted at the first meeting at Stony Creek, February 25th, 1897.

I. The name of the institute shall be "The Women's Institute of Saltfleet."

Object.

II. The object of this Institute shall be, to promote that knowledge of household science which shall lead to improvement in household architecture, with special attention to home sanitation, to a better understanding of the economic and hygenic value of foods and fuéls, and to a more scientific care of children, with a view of raising the general standard of health of our people. Mutual improvement, by an interchange of views, by essays, lectures or other means found practicable, upon all subjects pertaining to the welfare of our homes and families.

Membership.

III Membership in this Institute is open to all women who will take an active interest in the welfare of the Women's Institute of Saltfleet, and pay the annual fee. 25 cents. (Those joining before June will be considered in good standing for the year ending June 30th, 1898).

IV. The officers shall consist of Honorary President, President, 1st Vice-President, (4) 2nd Vice-Presidents, Secretary, Treasurer and three directors, who with the officers above named shall constitute the Board of Directors. Two auditors shall be appointed.

V. The Executive Committee shall consist of a President, Vice-President and Secretary

VI. The annual meeting shall be held on the first Thursday in June at the hour of 2 p.m., and at such place as the Board of Directors shall decide ; other meetings shall be held at such place and hour and as the majority of members present shall decide at each previous meeting.

VII. The officers shall be elected by ballot of the members after nomination.

VIII. For the better carrying out of the objects of this Institute it shall be divided into six divisions or branches, as follows :—

(1) Domestic Economy ; (2) Architecture, with special reference to Sanitation, Light, Heat, etc, ; (3) Physiology, Hygiene, Medicine, Calisthenics, etc. ; (4) Floriculture, Horticulture ; (5) Music and Art ; (6) Literature and Sociology ; Education and Legislation.

IX. Vacancies caused by death or resignation shall be filled at next regular meeting.

X. This constitution can be altered or amended by a two-thirds vote of the members present at the annual meeting, or at any regular meeting provided that notice of the proposed amendment has been given at the last regular meeting previous, but members absent from the meeting at which notice is given must be notified of the proposed amendment.

By-Laws.

Adopted at the first meeting on February 25th, 1897, at Stony Creek.

1. The management of the Institute shall be vested in the Board of Directors, of which five shall constitute a quorum for a regular meeting ; two members of the Executive Committee shall constitute a quorum thereof.

2. The President and Secretary shall be members, *ex-officio* of all committees.

3. The annual subscription shall be 25 cents, and payable in advance at each annual meeting.

4. Meetings shall be confined to ladies exclusively except on a vote of the members present to the contrary at a previous meeting.

5. The duties of the Honorary President shall be to preside at the annual meeting and consult and advise with the Board of Directors.

6. The duties of the President shall be to preside at all the regular meetings, and to see that all officers and members of committees properly perforn their respective duties ; to see that the Constitution, By-laws and Regulations of the Institute are observed and obeyed ; Draw all orders upon the Treasurer, subject to instructions from the Board of Directors, and generally to perform all duties pertaining to the office.

7. The duties of the Vice-President shall be to perform the duties of the President in her absence. The duty of the 2nd Vice-President shall be to perform the duties of the President in the absence of the President and Vice-President.

8. (*a*) The Secretary shall have the power of a Managing Director, subject always to approval of the Executive Committee.

(*b*) It shall be her duty to keep a correct record of all meetings, whether of Executive, Board of Directors, or meetings of the Institute.

(*c*) To receive all moneys and pay the same over to the treasurer, taking a receipt for the same.

(*d*) To conduct all correspondence in the name of the Institute.

(*e*) To call meetings by order of the President, or in her absence by order of the Vice-President, or by order of the Board of Directors, giving one week's notice.

(*f*) To report at the annual meeting, the number of members, the number of meetings held, and the number of subjects discussed, and the names of subjects, etc.

(*g*) To prepare and submit the Directors' report at the annual meeting.

9. The Auditors shall examine the Secretary and Treasurer's books and submit a report of the same in writing to the annual meeting.

10. It shall be the duty of the Treasurer to pay all orders drawn upon her by the President. The Treasurer shall present at the annual meeting a detailed statement of all moneys received and paid out, with balance on hand, and shall hand over to her successor, all moneys, books, papers, etc,, pertaining to her office, taking a receipt therefor

11. It shall be the duty of the Board of Directors to exercise a general supervision over the affairs of the Institute, having authority to act on all matters of interest when the Institute is not in session. It shall direct the payment of all moneys from the treasurer, and one Director shall be appointed by the Board of Directors for each division to arrange for one or more papers, essays, addresses, etc., for each division at each meeting, the President and Secretary alone being exempt from this duty. The Directors so appointed to remain in charge of the programme for their respective division three months.

12. It shall be the duty of the Executive Committee to carry out the wishes of the Board of Directors.

13. In case of a tie vote in the Board of Directors, the President has two votes.

14. The order of business at the annual meeting shall be as follows :

1. Reading the minutes.
2. Correspondence.
3. Report of Directors.
4. Treasurer's and Auditor's reports.
5. Bills and accounts.
6. Unfinished business.
7. New business.
8. President's Address.
9. Election of officers.
10. Chair taken by the new President.
11. Programme.
12. Notice of programme for next meeting.

15. The order of business at general meetings shall be the same with 3, 4, 8, 9, and omitted.

16. The by-laws can be amended or altered at the annual meeting without notice of motio by a two-thirds vote of the members present, or at any regular meeting, by a two-thirds vote, providing notice has been given at preceding meeting, but members absent at that meeting must be notified of proposed motion to come up.

A STEP IN THE RIGHT DIRECTION.—THE SALTFLEET WOMEN'S INSTITUTE.

By Mrs. A. Hoodless, Hamilton.

One of the most noted authorities in Great Britain on education in relation to agricultural development says: "Organization in the rural districts is as essential as education, and often a necessary preparation for it, and is just as valuable in the interests of woman's work as in that of man's work." Facts as stated above are usually discovered by those who are seeking light. One year before the educational conference was held in London, England, (during the Jubilee), at which this and many similar remarks were made, the women of Saltfleet township, County Wentworth, had decided to organize a Women's Institute, aiming to do for women what the Farmers' Institute does for men in the agricultural districts. The success of the movement has been almost phenomenal. Being the first of the kind in Ontario, if not in Canada, the difficulties which had to be overcome may be imagined. Public interest had to be aroused, and like the pioneer Farmer's Institute, had to prove its value before the skeptical could be persuaded that there was "anything in it." The women of Saltfleet have proved beyond question that such organizations are not only possible but are of immense educational value.

There are many advantages to be gained by such organization. It develops a new interest in scientific questions which relate to women's work on the farm and in the household. It promotes the spirit of sympathy and co-operation with the Farmer's Institute which has hitherto been unable to contribute much knowledge of practical benefit to women.

The Saltfleet Women's Institute started its career with forty members, which have increased to eighty-six. A constitution was prepared and adopted, officers were elected, committees formed for each department and from the beginning, interest has steadily increased. The first president, Mrs. E. D. Smith, who was ably supported by her husband, had not an easy position to fill, but the success of the Institute is a testimony to the careful and conscientious attention given by her to its early development, and it was with great regret that her resignation had to be accepted at the last annual meeting.

It is only just to say that the early success of the movement was due, in great part, to the active support and encouragement of the officers and members of the Farmer's Institute of the township. A spirit of harmony and mutual helpfulness has been the strong feature of the society.

The following list of subjects upon which papers were prepared and discussed may convey a clearer idea of the object of the society; subjects which relate so closely to woman's work and domestic happiness in every condition of society whether living in town or country, whether rich or poor, that any effort tending to a more intelligent performance of these duties must be accepted as a step in the right direction. The first subject to receive attention, and properly so, as upon it depends the physical and mental development, was "Foods," followed by "Proper Food for Children," "Art Home Decoration," "Women on the Farm," "Hygiene and Sanitation," "Child Training," "Housekeeping *versus* Homemaking," "A Talk to Girls," "Butter Making," "Sunshine, the Light and Life Giver," "Fruit as Food and Medicine," "Floriculture," "Food Value of Whole Wheat," "Physiology," "Women's Duties and Possibilities," etc. These are only a few of the subjects introduced, but any one can see that the discussion of such a variety of subjects must tend to widen the mental horizon, and provide much food for reflection. A most interesting feature of the meeting is the "Question Box," which not only enables timid members to make their desires known, but proves a valuable source of information for everyone.

In addition to the regular meetings held every two weeks, from October until June, a reading circle has been formed. The Chatauqua course on domestic science has been chosen. Dealing as it does with the household science in its various departments, it has proved not only an interesting course but of great value as an educational factor. Several entertainments have been given in Squires' Hall. Stony Creek, where the Institute meets. A number of prominent speakers have been heard on popular topics. Mrs. Rorer, of Philadelphia, the Domestic Science editor of the Ladies' Home Journal, delighted a large audience with a lecture on "System and Intelligent Management in the Home." Mrs. Hoodless, of Hamilton, the enthusiastic advocate of domestic science being taught in the public schools, and Honorary President of the Institute, has been present on several occasions and given helpful addresses on various phases of woman's work. Miss Watson, Principal of the Hamilton School of Domestic Science, Dr. Mabel Henderson, and Dr. Cockburn, of Hamilton, Miss Laura Rose, of Guelph, and others have added to the profit and enjoyment of the meetings. Music and recitations are also features of the entertainments.

The aim of the organization is to become affiliated with the Farmers' Institute and possibly secure a small grant which will enable each Institute to extend its efforts, provide literature, etc.

Should any reader of this report feel sufficiently interested to take steps towards organizing in other districts and desire further information, it is quite safe to say that Mrs. Erland Lee, President, or Miss Nash, Secretary, will gladly extend their knowledge of Women's Institute methods and benefits. Letters addressed to either of these ladies, Stony Creek, Wentworth Co., will receive courteous consideration.

WOMEN MAKE A DEPARTURE.

The Farmers' Wives of Wentworth Form an Institute.

They recognize that they have as much need of instruction in proper methods as have their husbands—A contributor writes on the movement.

About a year ago the women of South Wentworth took a new departure, the results of which have not disappointed its most sanguine promotors. An organization was formed at Stony Creek known as the Women's Institute, intended to afford the same benefits to the farmer's wife as her husband receives from the Farmer's Institute, of which the new society is a branch. The writer on a recent visit to the District made some enquiries regarding the character of the movement, and deemed that the information he obtained might prove of interest to our readers.

The need of such an Association among the women of the rural districts is most patent. They have not the opportunity the men have for meeting one another and discussing matters outside of the narrow routine of their daily lives. This advantage precludes the getting of new ideas, which would greatly widen their sphere of usefulness. To make a success of farming there must be co-operation between the farmer and his wife, There are many interests about the farm which are closely connected with the domestic work of the thrifty housewife, and latterly their commercial value has made them highly important factors in adding to the financial returns from the working of the farm. Such adjuncts are dairying, poultry and bee keeping, the preservation of vegetables and fruits, stock-raising, etc. The foregoing are yearly becoming more and more profitable features of the work, and the wife can, with most successful results, aid her husband's endeavors in this direction. But, in order that she may prove a help rather than a hindrance, she must have some scientific knowledge of the work in hand.

Much is lost by many a farmer through his not knowing how to get rid of his products. If he knew how to prepare the product of his dairy, of his bees, etc., for shipment, his gain would be enormously increased. Very few farmers' wives are capable of trussing a fowl properly for shipment. And they will never learn unless the knowledge is procured from outside sources. In the monotony of their lives no new methods are involved, but everything is done according to musty tradition handed down for generations from mother to daughter.

With the object of remedying these conditions and making themselves indispensable helpmeets, the women of South Wentworth organized. Their aid cannot be better set forth than in their own words. It is, "To promote that knowledge by household science which shall lead to improvement of household architecture, with special attention to home sanitation, to a better understanding of the economic and hygienic value of foods and fuels, and to a more scientific care of children, which will raise the general standard of the health of the people." It is rather ridiculous for the farmer to study out the food best adapted for the nourishment of a certain kind of stock and base his conclusions on a scientific investigation of the properties of different foods, while at the same time his own diet is neglected so that his condition soon presents a marked contrast to that of his healthy animals. It is a well-known fact that the whole economic structure rests upon the agricultural community. When we consider this, how important a prop is the farmer's wife.

The Women's Institute does not hold its meetings once or twice a year, but fortnightly, and as the field of discussion is a somewhat large one it has been sub-divided under several heads; (1) Domestic economy; (2) Architectural (sanitation, heat, light); (3) Physiology, hygiene, medicine; (4) Floriculture; (5) Music and art; (6) Literature, and sociology, education and legislation. Papers are read and are followed by a general discussion. The knowledge acquired by the enquiry and research necessary in the preparation of a paper is invaluable to its author. Among the treatises which have already been presented at meetings of the Institute are somedealing with the following subjects, "Goods," "Women on the farm," "Butter-making," "Sanitary Hints for Housekeeping," "Floriculture," "Home Decoration by Girls," "Fruit as a Food and Medicine," and so forth.

It is the unanimous testimony of the members that they have received undreamt of profit from the suggestions brought out in the papers and discussions, and what has benefited one community should be of equal benefit to another. The agricultural authorites, moreover, are very much in favor of the formation of Women's Institutes, and hope to see them organized wherever there is a Farmers' Institute. The inauguration of the movement by the women of South Wentworth speaks volumes for their enterprise and progressiveness.—[From Woodstock *Sentinel-Review*, August 13th, 1898.

APPENDIX.

SELECTED PAPERS READ AT MEETINGS

OF

FARMERS' INSTITUTES.

1897-8.

AGRICULTURAL EDUCATION.

NOTES ON THE AGRICULTURAL COLLEGE, GUELPH.

The interest of the farming community in the College at Guelph seems to grow from year to year. Over 30,000 people, from different parts of the Province, visited the College in the month of June. These visitors went on excursions run by Farmers' Institutes, and the great majority of them were outspoken in their praise of the treatment which they received, and of the work done at the College. And the peculiar thing about these excursions is that the same people go from year to year and always seem well pleased with their visit—always learn something, and return better fitted for work and life on the farm.

Students in Attendance. There is no doubt that of late years there has been a marked increase of confidence in the work of the College. The attendance of students in 1897-98 was considerably larger than at any time in the past. Every room was occupied, and about thirty had to lodge outside during part of the year and the character of the students has improved. The great majority of those now in attendance are farmers' sons of the best type.

The Farm. The farm proper is in a much better condition than it was in days gone by. It is no longer necessary to refer students to the United States, Great Britain or Germany for object lessons illustrative of what is taught in the class room. They have all they need on their own farms right there. The farm has at length become a source of strength to the College.

The Experimental Department. This department has grown and developed till it has become one of the most extensive and useful stations on the continent, especially in the line of field experiments. The results of the work of this department, published from year to year in the annual reports of the College, are of inestimable value to the farmers of Ontario. It is a matter of great importance to farmers to know which are the best varieties of grain to sow, and to have the latest and most reliable information as to the selection of seed, dates of seeding, methods of cultivation, mixtures of clovers and grasses, the growing of green fodders, the feeding of animals, and other matters which bear directly upon their work throughout the year.

And the co-operative tests, made at over 2,000 different places throughout the Province, chiefly by the students and ex-students of the College, under the direction of the college experimentalist, check the results obtained at the College, and add greatly to the value of the work done by the institution.

The Dairy School. The Dairy School in connection with the College opens on the the 4th of January, and continues its work for twelve weeks. Last session there were 110 students in this special three months' course, most of them now employed in the cheese and butter factories of Ontario. During the remaing nine months of the year two men of the department devote their time to experimental work—one in cheese and the other in butter—endeavoring to solve problems which arise in the factories and creameries of the Province; and one point especially should be noticed, that is, that any man or woman, boy or girl, can go at any time of the year to the *Home Dairy Department* and receive instruction in butter-making free of charge—no examination to pass, no fee to pay. They have simply to go and stay as long as they wish—three days, a week, or a longer period. What more liberal terms could be offered to those who wish to increase their knowledge of this important branch of agriculture.

THE HORTICULTURAL DEPARTMENT. In the Horticultural Department there is much to interest farmers, fruit growers, market gardeners, and florists—five or six greenhouses furnishing plants and flowers for lectures and practical work in botany and horticulture, a good-sized orchard, a considerable plantation of small fruits, a large vegetable garden, a beautifully arranged arboretum, and several very interesting clumps of forest trees; and a considerable amount of experimental work is being done in the department, especially in testing varieties of fruit, flowers, and trees.

BACTERIOLOGY. Under this head the College is instructing its students in life history and characteristics of some of the innumerable foes of man and beast known by the general name of *bacteria*. It is likewise investigating the question of foul brood in bees, and manufacturing tuberculin, or the substance which is used to test animals for *tuberculosis*. This substance is sent free to farmers to test their own cattle; and to others who want it ten cents a dose. It is given to farmers without charge on condition that they report the results of their tests confidentially to the College bacteriologist for the private information of the department.

POULTRY. In the Poultry Department, also, we find much to interest farmers—a complete set of houses with suitable yards, coops, drinking fountains, etc, twenty-five odd varieties of hens, of fifteen or sixteen breeds; and four or five hundred chickens, which will be in good shape for sale in October or November.

Add to all this the special College equipment, not only the ordinary school-room appliances, but well-equipped laboratories for practical work in chemistry, physics, biology, bacteriology, horticulture, etc., and we have no ordinary institution.

The general verdict is that the College is a credit to the Province and is doing excellent work, directly for the farming community and indirectly for other classes.

THE RELATION OF AGRICULTURE TO OUR SCHOOL SYSTEM. *

"Perfect agriculture is the true foundation of trade and industry—it is the foundation of the riches of states."

These are the words of the great Liebig, one of the founders of the modern science of agriculture. They were uttered half a century ago, but they are more pregnant with truth at the end of the nineteenth century than they were in the middle of the century when Liebig was carrying on his agricultural investigations, or than at the beginning of the century when Sir Humphrey Davy was unfolding for the first time his memorable proposal for agricultural investigation before the learned societies of England. They are applicable to all civilized, to all semi-civilized countries, but they have a special significance when applied to Canada; for while our fisheries add annually to our wealth to the amount of about $20,000,000, and our mines nearly $30,000,000, and our forests about $80,000 000—agriculture adds no less than $600,000,000, or nearly five times as much as the other three sources of wealth combined .

The perfect agriculture of Liebig implies, of course, a class of agriculturists well equipped, thoroughly trained, and rationally educated.

Now let us quote a more modern educationist as to the workers in this field :

"Identified as I am by birth and early education with the agricultural population of this country, I regret to see so many of our agricultural youth leave the noblest of earthly employments and the most independent of social pursuits for the professions, the counting room, the warehouse, and even for petty clerkships and little shops. I know that persons in public offices, and inhabitants of cities and towns, who have no farms, must, for the most part, bring up their sons to other employments than that of agriculture ; personal peculiarities and relations may prompt to the same course in regard to some farmers' sons ; and a divine call may select from the farm, as well as from the shop and the college, for a divine vocation ; but that, as a general rule, the sons of farmers, as soon as they begin to be educated, leave the farm, is a misfortune to the parties themselves, a loss to agriculture and to the country. A boy's leaving the farm because he has, or is acquiring, a good education, is an assumption or admission by all consenting parties that a farmer does not need such an education ; and as long as this error is admitted, by farmers not being educated, agriculture will be looked down upon, instead of being looked up to, as a pursuit for educated men.

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* An address by C. C. James, M. A., Deputy Minister of Agriculture, before the Natural Science Department of the Provincial Teachers' Association, April 14, 1898.

"Politicians are accustomed to call farmers, by way of compliment, the bone and sinew of the land ; and bone and sinew they will remain, and never be anything else, without education. It is a supreme law, illustrated by all history, that head rules muscle ; and all farmers who educate only their muscles, and not their heads, must occupy the inferior relation of muscle. It is true that such farmers, as well as mechanics, may be and feel themselves quite as good as other people ; but if they are not as intelligent—that is as well educated and informed—their goodness will be associated with ignorance, and their social position will necessarily be one of inferiority, But let the boy be educated to make him a better farmer, as well as a better citizen ; let it be assumed, and become a recognized fact, that a farmer must be educated to be a good farmer, as a lawyer, doctor, or clergyman must be educated to be master of his work, and agriculture will hold a rank equal to, if not above, law or medicine. Educated farmers, educated merchants, and educated manufacturers and mechanics, will not only develop and advance the material interests of the country, but its civil and social interests, by enabling the people to select chiefly intelligent and well-to-do men from these classes as their representatives—men not needing an office for support, or making politics a trade— affording the best chance of practical wisdom and honesty in legislation and government, and the hope of producing the great public desideratum—a generation of honest politicians and patriotic statesmen."

One might reasonably assume that this is an extract from an address before one of our Ontario Farmers' Institutes, or has been taken from a lately issued report of the Ontario Department of Agriculture, and that they are the words and opinions of some leading agriculturist. Not so, however. These are the words of Egerton Ryerson, taken from the introduction to his text-book on Agriculture for use in Ontario Public Schools, and written in 1870.

Were these statements true and applicable in 1870 ? Then they are even more so in 1898.

I can well believe that twenty-five years from the present some student of the educational and economic history of this Province will be hard at work studying out and trying to explain why so little progress was made in general agricultural instruction in this Province during the years from 1870 to 1898. During the period four text-books at least were available, the one by Dr. Ryerson already referred to, one by Prof. Henry Youle Hind, one by Dr., now Sir, Wm. Dawson, that first appeared in 1864, and the "First Principles of Agriculture," by Dr. Mills and Prof. Shaw, that appeared in 1890.

An interesting discussion might be made on the subject of why the trustees of rural public schools at least have not insisted upon having instruction given on this subject, based upon the book prepared by Messrs. Mills and Shaw.

It is not my purpose in this short address to take up this subject—instead of looking backward we should examine the present situation and lay plans for the future.

At the present time the subject of general instruction in public schools is being carefully worked out in France, Germany, Italy, and even in darkest Russia. Many of the most progressive of the States to the south of us are also discussing the question, and in some cases at least a promising start has been made.

In the Province of Manitoba a course of agricultural instruction has been laid down, and a text-book prepared adapted to the conditions of that Province.

In Quebec more has been done in the way of editing and publishing text-books in various departments of agriculture than in any other province, and a continued effort has been made to make the instruction as general as possible.

In Ontario, however, we shall have to work out our system on the lines that are best adapted to this Province, and it will not do to try to copy very closely the system of any other country or any other province. We can have our own system if we desire it, and we can have a system adapted to our own conditions of agricultural and suited to the mental capacity of our pupils.

So much for what may be called the introduction to my paper. Let me now briefly state my views under three heads:

1. Should agriculture be taught in our schools?
2. When and where should it be taught in our school programme?
3. What can be taught, and how can it be taught?

1. *Should Agriculture be Taught?*

If agriculture can be taught in our schools, that is, if there is time and place for it, and if it can be presented in a form adapted to school pupils, the more reasonable form for this question, it seems to me, is, "Should agriculture not be taught?"

The agriculture of this Province is in a critical condition. We certainly have not yet reached the most acute condition that have come to the farmers of Great Britain, France, and Germany, but we have reached a point which, compared with these conditions of the never farming communities of Manitoba, the North West Territories, and other sections similarly situated, can be expressed by no better term than the one I have used, viz: *critical.*

The building up of the pure-bred live stock interests of this Province and the development of our dairy industry have been the two main factors in saving us from a condition that could be described only by the term "desperate."

Just at the present time the conditions are more favorable than they have been for some time. Prices have improved for us, mainly because of the temporary misfortunes of agriculturists in other parts of the world. One consequence of this is seen in the great rush at present in progress for the cheap productive lands of Manitoba and the North West Territories. If nothing be done to give a decided upward movement to our Ontario agriculture, however, we may soon find ourselves approaching the conditions now prevalent in the older farming lands of Europe. Let me give you a statement of that condition from the pen of one who is an authority. M. Tisserand, the late Director-General of Agriculture in France, speaks as follows in a report to the Recess Committee of the British House of Commons dealing with the question of the industries of Ireland:

"In this extraordinary century, when everything has been profoundly modified by steam, when distances have disappeared, and the Australian with his wool, the Indian with his corn, * the American with his cattle and his dead meat, can reach the markets of Europe at less cost than it took the farmer of Yorkshire at the beginnning of the century to get produce to London, old methods and paternal traditions have become insufficient for the struggle which has to be carried on against foreign competition. It is no longer the struggle for life between man and man which is in question; it is the struggle for existence between industry and industry, between agriculture and agriculture, between country and country.

"The struggle which agriculture has to sustain is all the more intense and severe because it has been less prepared for it. The formidable transformation brought about by the progress of railways, navigation, and the telegraph has had a greater effect on agriculture than on any other industry, because it has been surprised, so to speak, in the midst of the calm and quietude which it had been enjoying. It is no doubt a great boon to humanity that the products of the earth may overflow with an extreme facility from the regions in which they abound to the countries that need them; that every individual is assured his daily bread, and has no longer to fear the horrible famines which in other times periodically decimated the population; that, thanks to the Australian wool and vast pasturages of the new world, the workingman can obtain cheap clothing and cheap food to protect him against infirmity and give him health and strength. But if these are results to be thankful for from the humanitarian point of view, it is nevertheless true that they have had upon agriculture, through the general lowering of the prices of produce, an action which has placed it in a critical situation, and which has thrown the cultivators into confusion and brought discouragement and despair among the rural population. All thoughtful minds, the public powers, and Governments, are occupied with these considerations. In all directions it is felt that the agriculture of Europe is like an old and leaking ship, tossed and buffeted about upon a sea of breakers, and that, to save it from foundering, it needs to be steered by abler hands and navigated by pilots who will join to a thorough practical training a profound and extensive scientific knowledge."

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* Reference is made here to the native of British India, and the word "corn" includes grain of every kind, with special reference to wheat.

The authorities of France are thoroughly awake to the situation, and are now carrying on the most thorough system of general agricultural instruction in order to provide trained men to man the "ship" in her perilous career.

Two things especially are, in my opinion, of prime importance now to save the agriculture of this Province and the agriculture of Canada from being reduced to the level of cheap lands, cheap labor, and cheap mental calibre. The first is the rapid development of our deep waterways system, so that the advantage may be maintained of the very lowest transportation rates on all farm products for export to Europe, and the completion of a perfect system of transportation, so that our fruits, including peaches and grapes, butter, eggs, poultry and other perishable products may be safely and cheaply transported to the consuming markets of Europe. It *may* be advisable to divert some of the rushing American tourists for Europe from New York and Boston to Montreal, St. John, or Halifax, but it means vastly more wealth to this country to be able to send our valuable and perishable farm products to London, Liverpool, Bristol, Glasgow, or Manchester in perfect condition.

The second requirement is that our agriculturists shall receive some grounding in the scientific principles underlying their work, so that farm practice may be more intelligently directed, and that some of the great waste of time and labor may be saved to this important industry.

One of the distinguishing features of the agriculture of to-day is the rise of co-operative associations. In Ontario we have had agricultural societies ever since the Province was organized, and for nearly seventy years legislative grants have been made for their encouragement. But the societies for discussion of agricultural topics, for interchange of ideas, and for teaching or instruction by experts are of recent origin. We have associations of the owners and breeders of all the leading breeds of live stock. We have a Fruit Growers' Association, associations also of the poultry keepers and of the beekeepers, an association of experimenters, two associations of the dairymen, and an Entomological Society. All these, through their many meetings, and the hundreds of meetings of Farmers' Institutes' have quickened the minds of the workers. Supplementing these meetings, reports and bulletins have been distributed by the hundreds of thousands in the past ten years. But the point that I wish to make here is that the persons principally benefitted by this work are the men and women of mature years. This is all very well in its way. These men appreciate thoroughly what is being done; they recognize the importance and the necessity of this instruction—but is it not beginning at the wrong end? Why should the farming class of this country have to wait until they become men before they learn that there is a science underlying their practice? If it is a good thing to educate a grown man or a grown woman in the principles of agricultural work, it is still more important, as far as practicable, to give the boy and the girl some training in these principles early in life, at the time when these principles are most easily acquired, and when they will be of most permanent benefit. I, therefore, have no hesitation in answering my first question by saying that agriculture in some form should be taught to the pupils of our schools.

2. *When and Where should it be Taught?*

Most persons, I think, are of the opinion that some instruction in agriculture should be given to pupils in rural schools, since they assume that these pupils are to be the future farmers. They are not, in general, of the opinion that the teaching should be given in towns and city schools, because the pupils of such schools are likely to move out into professional pursuits, become school teachers, enter mercantile life, or follow some one of the many manufacturing lines of life. They are not quite sure that all pupils in rural schools even should be taught agriculture, as so many are yearly coming from the country to the town to reinforce the struggling city classes with new blood and new physique. Right here I would present a debatable statement. If agriculture can be taught in our schools in a manner such as I will suggest in my next division, I am of the opinion that it should be on the course of study for town and city pupils as well as on the course for rural pupils. Perhaps in city and town schools it might be made opitional, but in rural schools it should be obligatory. The present situation is that, with very few exceptions, all town and city pupils will remain in city and town pursuits, and the country schools are also being annually drained of the majority of the brighest and most promising. But this, I contend, is not a very promising feature of our country's growth. It may be due in some part of the very nature of our present system. That I shall not here discuss. If we can, by altering or rearranging our system, keep more of the best rural pupils in touch and work with agriculture, and if we can at the same time arouse in some of the towns and city pupils a sympathy for agricultural methods and agricultural life, we shall be looking to the best interests of the pupils and the country as a whole. I am of the opinion that a course of agriculture can be given in town and city schools that will be interesting and beneficial, and that will be in harmony with the best educational methods or system. I would put a course in the science of agriculture within the reach of every pupil in all of our schools, and I would therefore begin the work in the public schools, rural and urban alike. In the schools of France, where agricultural education has been most fully taught, instruction in this work begins in the primary schools in the elementary course, with pupils from seven to nine years old, and is followed out through the middle course, nine to eleven years, and the superior course, with pupils from eleven to thirteen years old. It might be best to begin the work here by making agriculture a compulsory subject in the 4th form of our public schools, and from this as a starting point work out in time a system of instruction adapted to our conditions, prefacing it first by a simpler course in the third form, and adding an advanced course to our high school work.

I believe that agriculture can be taught just as well to the public school pupils as are some of the subjects at present on the course, and I believe that the pupils themselves will come to the subject with as much eagerness. I do not care to particularize or to make comparisons, but perhaps you will permit one remark, viz.: If public school pupils can master the subjects of physiology, hygiene and temperance, they are well able to take hold of the subject of agriculture, and I think it can be made more intelligible to them.

3. *What can be Taught and How should it be Taught?*

This is the most important of the three questions; it is that upon which the whole argument turns. I think that delay in introducing agriculture into our schools has occurred principally because of the difficulty, in fact, the present impossibility, of introducing into our schools instruction as to how to farm. Our schools could not be equipped for training in the practice of agriculture except at an enormous cost, and our public school teachers could not be expected to teach the young how to farm even in the crudest manner. Here is the point—any instruction now given in our schools should deal simply with the *science* of agriculture; the practical application of the scientific principles may be left to the home training and to such specially equipped institutions as our Agricultural College. It is quite possible that in time something may be done for our rural schools, as has been done in France and other European countries in the way of adding small gardens and plots wherein some of the lessons of the school room may be applied, and where illustrations may be found in the growing trees and shrubs and the development of seeds sown by the hands of the pupils themselves.

This mistake of confusing the science and the practice of agriculture is quite general, and some of the text-books placed in the hands of young pupils have no little responsibility for continuing the mistake.

I consider the science of agriculture eminently adapted for school instruction, and a future student of natural science could not lay a better foundation for his future work than by first mastering the general principles of the various sciences which together form what we call the science of agriculture. Let us note briefly what it includes.

Agriculture consists mainly in the growth of plants, the feeding of these plants to animals and the working over of the animal products resulting.

First of all we have the air and the soil. A study of these gives us an introduction to chemistry, geology and meteorology.

The growth of plants brings in the study of botany, and closely follows an introduction to entomology.

The study of the animals at once calls for some of the simplest principles of zoology, anatomy and physiology.

Even bacteriology comes in when we study the diseases of the plants and animals and the making of cheese and butter.

And so we might sum up by saying that a study of the science of agriculture implies a beginning in the study of all the natural sciences that are afterwards found in our high schools and colleges. The study of the science of agriculture is to a large extent a course in "nature study," and since the illustrations are taken from plants, soils, insects and animals with which all boys and girls are more or less familiar, the subject may be made to appeal to the everyday observations of the pupils. What should be done, then, is to give the pupils an insight into the first principles of the various sciences, laying stress upon these laws and principles that have an application to the work of agriculture. Let me put it in the form of a few questions.

1. What is the atmosphere, and how does it affect the soil ?
2. What are the causes and effects of rain ?
3. How is soil originated ?
4. What are the principles underlying tillage and drainage ?
5. What changes take place in the sprouting of seed ?
6. How do plants feed and grow and mature seed ?
7. How are new varieties of plants produced ?
8. How do animals digest food ?
9. What is the life history of a butterfly, a beetle, an aphis or a honey bee ?
10 What are the causes of fermentations in the soil, in the silo and in milk and cream ?

A thousand and one other questions might be put, the answers to which would be given by a knowledge of the first principles of the sciences of chemistry, botany, entomology, geology, physics, physiology or bacteriology. An acquaintance with such would be useful and interesting to all classes of students, whether coming from the farm or not, and to all classes whether going to the farm or not.

What I am trying to lay before you as my idea of how agriculture might and should be taught in our schools has been more clearly and forcibly put by that master teacher Huxley, who, in addressing a farmers' club in England on this subject, spoke as follows :

"There are some general principles which apply to all technical training. The first of these, I think, is that practice is to be learned only by practice. The farmer must be made by thorough farm work. I think I might be able to give you a fair account of a bean plant, and of the manner and condition of its growth, but if I were to try to raise a crop of beans your club would probably laugh consumedly at the result. Nevertheless, I believe that practical people would be all the better for the scientific knowledge which does not enable me to grow beans. It would keep you from attempting hopeless experiments, and would enable you to take advantage of the innumerable hints which Dame Nature gives to people who live in direct contact with things.

"And this leads me to the general principle which I think applies to all technical training of all school boys and school girls, and that is that they should be led from the observation of the commonest facts to general scientific truths. If I were called upon to frame a course of elementary instruction preparatory to agriculture, I am not sure that I would attempt chemistry, or botany, or physiology, or geology as such. It is a method fraught with the danger of spending too much time and attention on abstraction and theories, on words and notions instead of things. The history of a bean, of a grain of wheat, of a turnip, of a sheep, of a pig, or of a cow, properly treated—with the introduction of the elements of chemistry, physiology and so on as they come in—would give all the elementary science which is needed for the comprehension of the processes of agriculture, in a form easily assimilated by the youthful mind, which loathes anything in the shape of long words and abstract notions, and small blame to it."

I have already mentioned one misconception that has retarded the introduction of agriculture as a permanent part of our school system, viz. : the idea that it was intended to give some instruction in the practice of agriculture, whereas nothing should be attempted but the first principles of the various sciences that are connected with or underlie agriculture, taking up the application of these sciences to agriculture.

Another fault is the attempt on the part of some persons *to try to do too much.* We must not crowd too much on the young mind or mental dyspepsia will result, followed by a loathing of all forms of mental food. The work, when first begun in the public schools should be very simple, very restricted, and should call into activity the open eyes and open ears of the pupils.

Every rain that falls, every tiny stream by the roadside, the shooting of the green blade in the spring, the nodding buttercups, the golden rod, the tall bull thistle, the early dropping apple with its worm hole, the ball of black knot upon the cherry, the jumping grasshopper and the hundred of nature's children should attract the attention of our children out of doors, and arouse in them a love that is not born of ignorance but of true knowledge. Nature in the country, in the village, in the town and, to a limited sense, even in the city, lies before our children as a great unnoticed, unmeaning book. Our children by their natural sympathy with nature, and by their God-given faculties, appeal through us to the great Creator of nature. "Open Thou mine eyes that I may behold wondrous things out of Thy law."

Another objection that comes up in the minds of some, and that even finds expression, is that agriculture is not on a high enough plane, that there is more dirt than diamonds in it, that there is lacking the æsthetic element. Those who think and speak thus have evidently not given an honest consideration to the subject or are not aware of of the marvellous progress of agricultural science in the past fifty years. I have, I think, answered this by saying that the science of agriculture is nothing else than a comprehensive grouping and intermingling of the other sciences that are now studied in our schools and colleges.

I could, had I time, discuss the possibilities of increasing our agricultural wealth by a general dissemination of agricultural information among the rural classes. Our annual agricultural product is now about $250,000,000 in the Province of Ontario alone. I could prove even to those of you who are not farmers that this can easily be increased by twenty-five per cent., and a sum added to our annual product that would cause the tales of the Yukon to sink into insignificance.

In 1892 I addressed the Provincial Teachers' Association upon this subject, and my opinions of that year are stronger and more decided in 1898. I shall close this paper with the concluding paragraph of that address :

Instruction in agriculture in our schools may be very limited, but if nothing more be done than to start our rural pupils thinking, to give them an impetus or a turn in the right direction, to develop in them a taste for agricultural study and investigation, to arouse in them a desire to know more and to read more about agricultural affairs, and especially to increase in them a respect for their work and a pride in their calling, then the most important end of their education will have been attained.

AGRICULTURE IN ONTARIO PUBLIC SCHOOLS.

The teaching of agriculture in the public schools of Ontario has been much desired by the farmers, as well as many others deeply interested in the welfare of this great industry. An opportunity has been afforded by the Minister of Education of making another start in this work. It is confidently hoped that the Minister will soon see his way clear to making the subject compulsory, at least in the rural schools. In this connection it has been considered advisable to place here on record the concluding part of an editorial review of the new text book by William Houston, M.A., Director of Teachers' Institutes for Ontario :

Mr. James, basing his opinion on experience, firmly believes in the feasibility and desirbility of teaching agriculture in the public schools of both grades.* In this view most farmers and many teachers will readily coincide. A marked revolution in this respect has taken place within the past few years as the result of holding an immense number of farmers' institutes in all parts of the Province, At these meetings the expediency of making agriculture a school subject is frequently a theme of discussion, and the more it is debated the stronger and more widespread becomes the conviction that such an educational policy would be amply justified by experience as well as by *a priori* reasoning. "Teach a boy," said Aristotle, "what he is to practice when he becomes a man," and, rightly understood and wisely acted on, the aphorism is pedagogically sound. The discussions at the farmers' institutes themselves would be far more useful than they are if the young men who are just entering on an agricultural career had been properly educated for it.

The most thoughtful and experienced teachers are now turning to what is called "nature study" as a means of counteracting the cramping effect of a too exclusively bookish education. This prompting impulse is one of the most hopeful signs of the times from the educational reformer's standpoint. Real culture cannot be acquired from books alone. It depends on the systematic exercise of the observing faculty on subjects at first hand, and the equally systematic exercise of the reasoning faculty in the analysis, comparison and classification of observed phenomena. "Culture," once said Sir Morell Mackenzie, "is not amassed knowledge, but a condition of intellect," and the condition he refers to is just that kind of ability which enables one to find out things for himself instead of turning helplessly to others or to books for information.

Very little consideration is necessary to show that of all forms of "nature study" agriculture is the very best for this purpose. All its processes depend for their result on the operation of natural laws, which may be discerned at work through the observation of phenomena. The agriculturist should be encyclopædic in the range and variety of his acquirements, but it is still more important that he should be a keen and persistent investigator. The pupil cannot be made "learned" in the scientific sense, but he can secure a wide and useful acquaintance with the theory of agriculture if his teachers know how to put him in possession of it. A boy at school cannot be developed into a practical farmer, but he can have his curiosity aroused about the meaning and purpose of everything the practical farmer does. He cannot be trained to draw a straight furrow, but he may be made to think in a culture producing way about the utility of plowing and to reason intelligently about the different modes of mechanically preparing the soil for the seed. He cannot have the advantage of making practical use of fertilizers, but he may be made to inquire why their use is beneficial not to say indispensable. Even the æsthetic side of farming may be made profitable in a similar way by those teachers who know the subject and how to make advantageous use of it.

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*Public and High Schools.

One great obstacle to the successful introduction of agriculture in schools is the want of knowledge of the subject on the part of the teachers. So much may be admitted, and yet it is not the most formidable. It is often said that a teacher cannot teach what he does not know; but that is quite untrue, as a matter of fact, and is needlessly discouraging when the question of dealing with agriculture is concerned. The teacher who knows very little about this particular subject may teach it very well if he only knows enough to ask questions of his pupils and thus stimulate in them the true spirit of scientific inquiry. Indeed, if he knows a great deal more than they do he must, to confer on them the maximum of benefit, be able to put himself on their level, and pursue along with them the inquiries he starts from time to time. All his superior knowledge will be an educational delusion and a snare if he thinks his duty is performed when he tells them any amount of facts that ought to be useful and are supposed to be interesting, though they will quite certainly turn out to be neither.

In short, the true view of the relation which agriculture should bear to education is that it is one of the best "culture" subjects on the school programme, not that it will turn boys into practical farmers. It may do the latter, but, if properly used, it will certainly be the occasion of securing for pupils the right sort of education—one which will make them accurate observers, acute reasoners, and scientific experts. All this every farmer should be; but even if a pupil so trained should turn to some other calling, such habits of mind will prove equally serviceable. Book-learning acquired by mere rote-work is of no particular value for any purpose in life; the culture resulting from the practice of habitual research is of unfailing utility, no matter what subject has been used to secure it, and no matter in what calling it is made to serve its purpose.

AGRICULTURAL EDUCATION.

By G. A. Brodie, B.S.A., Bethseda, Ont.

That calling upon which the whole of the world's population are directly dependent for their sustenance, and upon which one-fifth are expending their daily toil, should command the most important attention, especially in a Province like Ontario with agriculture as its leading and most important industry. The educational system throughout should be framed largely to suit the requirements of an agricultural population. Our school system to-day is more suited to the business and professional population than to the farmers. A short time ago the temperance people had physiology and temperance introduced into the public schools, and the business men shorthand and banking into the high schools; and to-day it is in the hands of the farmers as to whether agriculture shall be introduced as compulsory into the public schools and the high schools throughout the Province of Ontario. Our calling is the oldest of all and dates back for thousands of years in the history of our empire. In fact, we can go back to the earliest days when Adam was ushered from Eden and sent to till the soil and earn his living by the sweat of his brow, and when Cain and Abel, the stock raiser and agriculturist, commenced operations. If we could follow the agricultural developments from this early date down to the present time we would find no marked changes, and we may say that our calling is still in its infancy and that its present improved condition belongs largely to the present century.

Some may say that our forefathers succeeded without an agricultural education and why should not we? In former days with their soils of virgin fertility, the non-prevalence of noxious weeds, insect pests, parasitic diseases, and with an even soil moisture and humid temperature, to sow the grain was to reap a bountiful harvest, or as some one has said, simply tickle the face of mother earth and she would laugh herself into a crop. To-day we have a soil in many cases robbed of its virgin fertility, the prevalence of noxious weeds and insect pests, and parasitic diseases, seasons of unequal rainfall often giving us drouths and floods, and to sow the grain does not mean a bountiful harvest, and to tickle the face of mother earth she would weep bitter tears of disappointment in a fruitless harvest of shrunken grain and foul weeds. The cost of living is higher at the present day; there are greater attractions, more public institutions to support, and with our excellent navigation and railway systems we are brought into the keenest competition with the greater part of the whole world. The rapid development along scientific lines in this scientific age also calls for more study and thought, so that we may be able to keep abreast of the times and to think and speak for ourselves, and to hold that position in society that our calling deserves. Formerly, John the dull boy would make the farmer, while James, his smart brother, must be a doctor or a lawyer, or what they called one of the learned professions. To-day no calling requires so much education or so much thought as agriculture. It is a most comprehensive study. It embraces the veterinary science in the treatment of at least the common diseases of domesticated animals; geology, in the formation and distribution of soils; entomology, as regards the nature, habits, and means of preserving those insects beneficial to the agriculturist; ornithology, as it deals with the beneficial birds and those injurious to fruit and grain crops; bacteriology, in so much as it relates to microscopic diseases of plants and animals, and the changes other than chemical in their products; botany, in the study of plant life generally—grains, clovers, grasses, trees, weeds, and vegetable parasites; chemistry, in the composition of soils, plants, animals, and the many chemical changes going on in each; physics, meteorology, zoology, and many others of minor importance might also be named, besides all the other lines of a general and literary education. A farmer must also be a mechanic, that he may know how to run his machinery to the best advantage, and as he is a business man he must also be a bookkeeper and a financier.

The question now arises how and by what means can we further agricultural education? Education begins at the cradle and ends only at the grave. Agriculture should, therefore, be introduced as compulsory into the public schools, and should be taught along with the A, B, C's, and continue throughout the common school course. Some may say that it has already been introduced both as optional and compulsory, and as often as it has been introduced has ended in failure,—not because it is not a suitable subject for the common school, but because the teachers generally were not qualified to teach it, having no special training for the purpose and were not interested, so that it was taught by an unattractive and dry method from text books instead of out of the great and ever attractive book of nature. Why could not one-half hour per day, or at least a couple of hours per week be devoted especially to agricultural training out in the open air. The most useful part of an education is a knowledge of our natural surroundings which are closely connected with agriculture, and this is the part generally left out altogether. Small children can learn the names of the various common birds, insects, and smaller animals, and distinguish between those beneficial and those injurious to agriculture, the noxious weeds, kinds of grain, grasses, clovers, flowers, shrubs, trees, and the uses of the sun, rain, air, frost, dew, etc., to the farmer. Notice the small children and you will see this training would be just along the line that their inclinations run. They chase the beautiful butterfly, moth and beetle, harken to the song of the birds, pluck the beautiful flowers, and glory in the sunshine. The higher forms could deal more with the classification, habits and life history of the various and most important insects, birds, and animals; classification of grains, grasses, weeds, etc.; classification and formation of soils; drainage, and its uses; cultivation of the soil, and in fact, all the elementary parts in connection with agriculture, taught when possible by object lessons. The subject of agriculture taught in this manner would be very interesting and attractive, and tend to bring the youth of the country up with more love for agricultural pursuits, demonstrating the truth of the old adage, "As the twig is bent the tree inclines." We also know if we teach patriotism to the youth we will have patriotic citizens Also teach of the attractiveness of our calling and of the dignity of labor and you will impress upon the children a lasting love for farm life, and will make contented, prosperous, and more respected farmers. It has been noticed in some countries since agriculture has been introduced as compulsory in public schools that the yield of grain has almost doubled, and that the dairy and live stock interests have also rapidly developed, showing what the teaching of agriculture in public schools has done. The high schools would require but little change. Those fitting themselves for public school teachers should take up the sciences and study them in reference to their agricultural bearing, instead of the languages, which are of little benefit unless the student intends taking a university course. If this was followed, in the near future we would have teachers specially fitted for their work. Now if this system were practieed, the pupil on leaving the public school would have received sufficient at least to interest himself in his profession and enable him to further pursue his studies at home. If able to proceed with his education the high school course will be along his line of study, and if desirable to proceed further a course at the Ontario Agricultural College would put on the finishing touches required. There he would have to deal more with the scientific side of agriculture, with the application of the various sciences, the breeding, feeding, judging, and the general care and management of all lines of live stock, and all the details both practical and scientific in connection with successful farming. The high schools would thus act as feeders to the Ontario Agricultural College, which course could be considerably shortened, not having to deal with the first principles of agriculture. This would give the farmers, who are the masses, a splendid course of training, and within reach of nearly all. If a course similar to the above outlined was in operation there would not be so much writing on how to keep the boys and girls on the farm, or how to keep up the rural population. Give them an education, and there is no danger but that they will enjoy and interest themselves in every branch of farming ; in fact, see into the midst of every little thing in nature that comes within range of the eye. "To me the meanest flower that grows can give thoughts that often lie too deep for tears." Until this takes place the agriculturist will not receive that place in society that his calling deserves and where it rests in the old land. The nobility of the old land do not consider it a compliment to be classed with the doctors and lawyers, but are proud to be classed as agriculturists.

Another point conducive to an agricultural education is the study of the best agricultural literature along both practical and scientific lines of farming. Agricultural journals are most essential, as is also a good daily commercial paper for the markets and general news of the country.

Farmers' clubs and institutes are also great educators of farmers. We meet and talk over our mutual interests, relate successes and failures, and freely discuss general agricultural topics. These meetings also tend towards combination, one of the greatest needs of the present day. All lines of trades and professions, from the greatest manufacturers down to the chimney sweeps, have their organizations and all act together, and thus have a commandant voice. The farmers have been contented to stand alone, and can therefore be over-ruled by almost any other class. Those gambling institutions in some of the greatest markets of the world have a weakening effect upon the prices of our produce and are interests adverse to those of the farmer. We should therefore be organized that we may be able to put down this grievance as well as many other smaller impositions common to our calling.

Lastly, I believe every farmer should educate himself in municipal, provincial, and in Dominion government, so that if the day should ever come when he is honored to represent any constituency he will be found master of the situation. It is a lamented fact that to-day that great body of people—the farmers of Canada—have only a small representation in the houses of Parliament, simply because they are not sufficiently educated for that responsible position. Then let us diligently plod onward, doing all in our power and might to further agricultural education and the social and financial condition of the farmer.

"The heights that great men reached and kept
Were not attained by sudden flight,
For they, while their companions slept,
Were toiling upwards in the night."

WHY BOTANY SHOULD BE TAUGHT IN PUBLIC SCHOOLS.

By Miss Alice Hollingworth, Beatrice, Muskoka.

For some time past more or less has been said on the subject of teaching botany in the public schools, but so far, in our country schools, where it is most important, but little progress has been made. An effort is being made in this line by the Botanical Club of Canada, by sending printed forms to teachers to be filled with the exact dates of the first flowering of plants in spring, leafing of trees, ripening of fruits, migration of birds, and the more common meteorological phenomena. The teachers are requested to encourage the children to make the observations called for on their way to and from school, bestowing some mark of honor on the most industrious. This not only adds interest and pleasure to school life, but it teaches the children the invaluable habit of using their eyes, and the Botanical Club gets the benefit of a full report. This plan has worked well where it has been tried. The object of the Club is to adopt means, by concerted local efforts and otherwise, to promote the exploration of the flora of every portion of British America, to publish complete lists of same in the local papers as the work goes on, and to have these lists collected and carefully examined in order to arrive at a correct knowledge of the precise character of our flora and its geographical distribution, and to aid in determining the effect of climate on plants and animals.

It is scarcely necessary for me to say *why* we should obtain all possible knowledge concerning the country in which we live. Our living depends on its resources, and the resources of the vegetable kingdom form no mean part of its products. Of course it is not necessary that we should exert ourselves in this matter It is quite easy to bask in the light of other people's accomplishments and put up with the dark for the rest. But at this particular season when we have such an abundance of "Maple-Leaf-Forever" sentiment in stock, I think it would be well to show what Canadian intellect is worth.

This is the practical side of the question, but there is the moral aspect of it. An hour spent with Mother Nature is an hour spent in the purest and most refining society. No evil impulse is ever stirred by contemplating nature's production. There are many who are not born with much capacity for appreciating these things, but it is an element that can be cultivated. I have observed repeatedly in young children as their minds begin to develop that love for flowers and animals is the ruling passion. Ten years later, in the majority of cases, there is scarcely a trace of interest left. No effort has been made to keep it alive, but instead of this their elders—with less sense than the children—tease them continually of beaux and marriage till the minds of the unfortunate children are filled with everything that should not be there, to the exclusion of the better thoughts and pure knowledge that wise parents seek to instil in them.

What child would not be interested and delighted to learn the history of the pollen grains, those little specks of yellow powder that fall from the flowers, looking so insignificant, yet on which the whole flowery kingdom is dependent for its further continuance. Each little particle of powder has, like an egg, an outer and an inner covering, and, as the egg contains the germ of life, so in this pollen grain may be found the germ or nucleus of the future plant. Along with the nucleus, our microscopists tell us, may be found protoplasmic matter and food materials, such as starch, oil, sugar and dextrine. When this grain falls on a little organ called the stigma, in the centre of the flower, it increases somewhat in size, and soon a tube, sometimes more than one, is thrust forth and passes through the loose tissue till it reaches the cavity where the first cell of the new seed is just forming. The contents of the pollen grain pass down through this tube, unites with the cell, and then the tube withers away ; but if the pollen fail to reach the stigma there can be no seed. Take the little folk out among the rocks and see how their eyes will brighten with interest when you tell them how these great piles of granite were once a mass of fiery liquid. Tell them something about nature's stupendous tasks in the early days of our globe, before it was fitted for the reception of that most noble creature, man. Then show them how carefully nature works in little things by pointing out on these same rocks the patches of black, green, yellow and gray. These are lichens, but so minute as to look more like a stain Their business there is to arrest particles of dust and the seeds of larger lichens. After a time you will fine the rock ornamented with lichens of various forms and colors. Some look like miniature forests, others suggest groups of ferns and rosettes of embroidery, while on the perpendicular face of high rocks is found a kind that resembles irregular pieces of cloth, black and woolly beneath, pale green and perfectly smooth above. These eventually decay, their mould affording a resting place for the seeds of grasses and other small plants. These also spring up, live their allotted time, and by decay add to the layer of mould from which they originated. Then come the larger mosses, and by this time a healthy green turf is formed, various new kinds of plants spring up and are matured; their intermatting roots bind the soil together while they live, and when they die crumble into dust and add a fresh stratum of earth to that which has now become fit for the reception of larger plants. Thus a succession of different forms of vegetable life goes on from the barely perceptible lichen, the humble moss, the annual grass, the tufted herb, the bushy shrub, to the stately oak or pine. In this way, and also in many other ways, the face of the earth is constantly changing, and the work of creation goes on to-day just as much as it ever did. That "truth is stranger than fiction" is never more clearly proved than in studying the ways of nature; her methods and resources are inexhaustible; every step we take reveals new wonders, everywhere we see the same perfect fitness of one part to another, and in all things a soul-satisfying beauty that carries with it a soothing balm and an elevating influence. Longfellow says most truly:

"If thou art worn and hard beset
With sorrows that thou wouldst forget—
If thou wouldst learn a lesson that will keep
Thy heart from fainting and thy soul from sleep—
Go to the woods and hills! there no tears
Dim the sweet look that nature wears."

Country children have double the chances for cultivating good morals that are granted to city children, yet what do we find? So far from understanding the productions of nature which surround them at all times, I doubt if there is one in fifty, or even one hundred, who could name twenty native plants, or birds, or insects, much less describe anything of their structure or habits. So many that only a few years ago some I knew as respectable boys are now disreputable young men who may be seen at any time reeling from the bar-room and polluting the air with the fumes of whiskey and tobacco and the vilest of language. Every fortnight or so these toughs assemble at a neighbor's house with their whiskey and tobacco, and spend the night in dancing, and—I shame to tell it—our girls gladly meet them, knowing what they are. Why have these young people no higher aim in life? Because parents and teachers have failed to teach them that there is anything better to live for. On one occasion I spoke at an institute meeting of certain objectional features in our social arrangements, and was severely censured for dwelling on the dark instead of the bright side, as if shutting our eyes to an evil would effectually put an end to its existence. To-night I have dwelt on the dark but painfully real side to emphasize my statement that botany, as well as other branches of natural history should be taught in our schools, if for no other reason than to store the mind with good things instead of leaving it vacant, ready to be occupied a little later by foul weeds. For the man or woman reared to idle or vicious ways there is little hope; but for the children who are surrounded with good influences there is every hope.

AGRICULTURE.

SEED SELECTION.

By C. A. Zavitz, B. S. A., Agricultural College, Guelph, Ont.

Good seed is often capable of turning poor crops into good ones; of bringing profits out of losses; and of giving hope amidst disappointment. The observing, thinking, painstaking, progressive farmer is the man who sows that seed which is likely to give the best crops. As there are marked differences between the crops produced from different selections of seed, a study of the results of the experiments presented in this article should be both interesting and profitable to all crop producers.

Maturity of Seed. Much has been said in regard to the proper time of harvesting crops in order to get the best results from the seed thus obtained. Many of the experiments which have been conducted along this line at different places have not been thorough enough and have not been continued for a sufficient length of time to give uniform and reliable information. An interesting experiment has now been conducted for three years in succession at the Agricultural College by sowing seed from two different varieties of wheat which had been harvested at five different dates, with a period of one week between each two dates. The first cutting took place when the wheat was in the milk condition, the third when the wheat was in the condition usually harvested in Ontario, and the last when the wheat was very ripe. In the average results of this experiment for the last three years it is found that the heaviest weight per measured bushel and the largest yield of both grain and straw per acre were produced from the ripest seed. This experiment, along with others closely allied to it, will be repeated for several years in succession in the hope that some valuable and reliable data will be obtained regarding the best time to cut wheat and other farm crops for the production of seed of the best quality.

Although the results of experiments conducted at a number of American stations are somewhat conflicting, the weight of evidence seems to show that immature seed has a tendency to produce an earlier crop, but that the plants are usually much weaker than those produced from mature seed. Some gardeners make a practice of using immature tomato seed thinking that by so doing they are enabled to get an earlier crop of tomatoes.

Size and Weight of Seed. The results of carefully conducted and long continued experiments in testing farm seeds of different sizes and of different weights should be both interesting and valuable for farmers generally. Work of this kind, which is laborious and expensive, can be conducted at an experiment station with great care and accuracy in order to secure reliable results for farmers who are unable to conduct such experiments upon their own farms. Every person who is directly connected with practical agriculture should be specially interested in knowing which kind of seed is likely to give the best results in his own fields. In order to furnish information along this line. very carefully planned experiments have been conducted at the Ontario Agricultural College for several years in succession by sowing different sized seed of several kinds of farm crops. Not only have these seeds been sown in boxes in the laboratory and in single rows in the field, in order to ascertain the comparative percentage of germination, but they have also been sown in larger field plots in each of which thousands of seeds have been used in order to ascertain the exact yield per acre produced by the different selections. Some of the experiments have been conducted for four or five years in succession, and some of them have been conducted in duplicate and in triplicate each year. Very careful selections have been made by securing an equal number of large plump and of small plump seed of oats, barley, spring wheat, and peas. The selections were made each year from fresh seed grown in large fields. The following table gives the yield in bushels per acre from large and from small seed of oats, barley, wheat and peas :

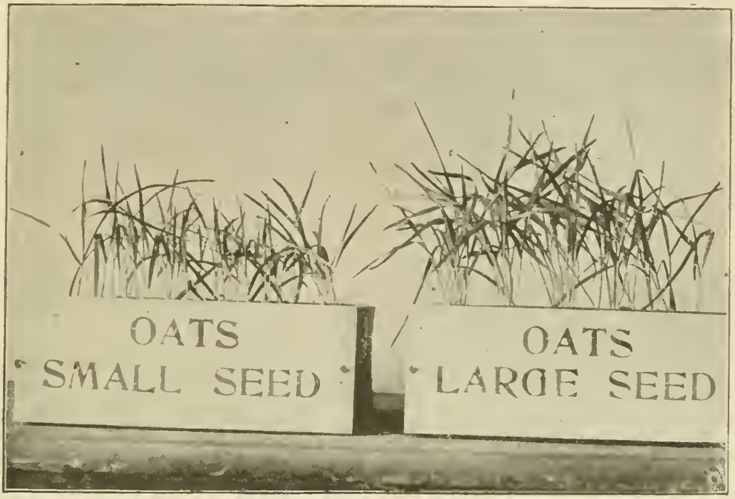
Crop.	Number of years tests were conducted at O. A. C.	Average yield of grain per acre.	
		Large plump seed.	Small plump seed.
		bus.	bus.
Oats	4	51.9	40.0
Barley	4	44.3	41.0
Spring wheat	5	21.7	17.0
Peas	2	23.4	21.0

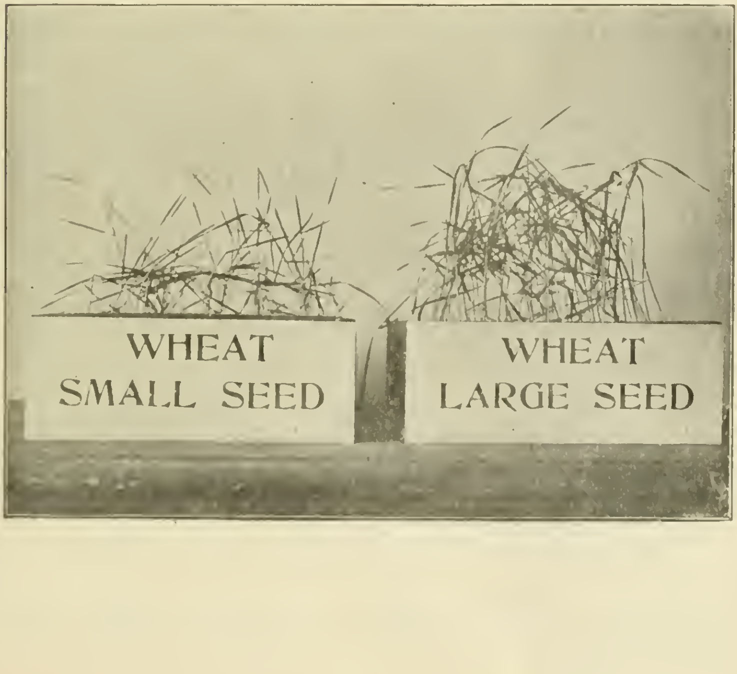
The greatest difference in the results produced in the two selections of seed is in the case of oats, as large plump seed produced nearly twelve bushels per acre more than the small plump grain. It will be understood, however, that it was a little more difficult to get small plump seed of the oats, than of the barley, wheat, or peas, owing to the oat kernel being surrounded by a hull. Much care was taken, however, to get as plump a sample as possible of the small seed in every case. By averaging the results for the four classes of grain, we find that the large plump seed has produced 5.3 bushels per acre more than the small plump grain. This amount is quite sufficient to make a marked difference in the profit or loss from an ordinary field of grain.

Another line of experimental work has been followed in which large plump, and small plump and shrunken seed have been selected from barley, spring wheat, and oats for four years in succession each selection being taken each year from the production of a similar selection of the year previous. One of the main objects of this experiment is to find out the influence on the comparative size of the seed produced through continuous selection along a definite line. Although it is intended to continue this experimental work for several years to come, the results of the selection on the fourth crop will no doubt be read with much interest. The average number of grains per ounce from the different selections of barley, spring wheat, and oats of the crop of 1897 is given in the following table :

Selection of seed sown.	Average number of grains per ounce of crop.		
	Barley. Fourth year.	Spring wheat. Fourth year.	Oats. Fourth year.
Large plump	621	949	1,309
Small plump	724	1,112	1,434
Shrunken	842	997	

It will be seen that the fourth crop of barley from large plump seed requires only 621 grains to weigh an ounce, while that produced from small plump seed requires 724 grains, and that from the shrunken seed 842 grains to weigh an ounce. The fourth crop from the large plump seed has produced the largest grain in every instance. No shrunken oats were used as it is very difficult to make this selection owing to the kernel being surrounded with a hull. In order to get the results given in the above table the same number of kernels of each selection were used—many thousand grains being sown in each plot. The reader will be enabled to watch the progress of this experiment as the results are brought out from time to time.


OATS
SMALL SEED
OATS
LARGE SEED


WHEAT
SMALL SEED
WHEAT
LARGE SEED

While more or less care is sometimes taken in the sowing of good seed grain, almost no attention is given to the the size of root seed which is sown in ordinary farm cultivation. The experiment with large, medium, and small seed of mangels, carrots, and turnips, which is now under way, shows the great importance of sowing but the best seed. The following table gives the results of experiments in sowing different selections of root seed for two and three years in succession.

Crops.	Number of years tests were conducted at O. A. C.	Average yield of roots per acre from		
		Large sound seed.	Medium sound seed.	Small sound seed.
		Tons.	Tons.	Tons.
Mangels	3	38.7	34.7	24.7
Carrots	3	30.7	27.4	20.4
Swedish turnips	2	15.1	13.7	2.5
Fall turnips (soft turnips)	2	23.8	19.7	10.9

While it will be observed that by taking seed of the leading varieties of root crops as purchased from some of our best seedsmen and carefully grading them we have realized nearly double the yield from the large plump seed as from the small plump seed. This shows that there is still room for much improvement in the ordinary practice of the farm. As many of our most interested visitors have observed the growing crops from the different selections of seed, they have become convinced of the great importance of sifting their seed and of using nothing but that which is large and plump for sowing in their fields. In summing up the results from the different selections of seed of the four classes of roots, it will be seen that there is an average of 27.1 tons per acre from the large plump seed; 23.9 tons per acre from the medium plump seed; and of 14.6 tons per acre from the small plump seed.

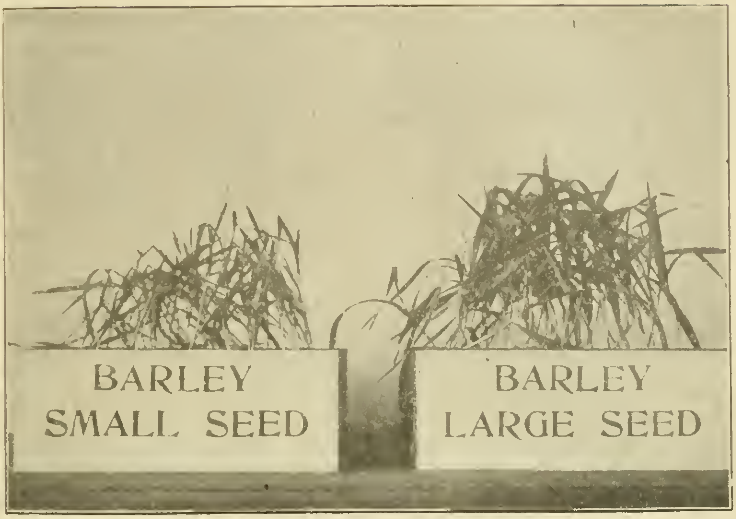
Very interesting experiments have been conducted in Germany, England, United States, etc. in testing seed of different sizes. It is impossible to give in this short article the results of all these experiments, or even to briefly summarize these results in anything like satisfactory form. A few references, however, to some of the most interesting experiments are here presented.

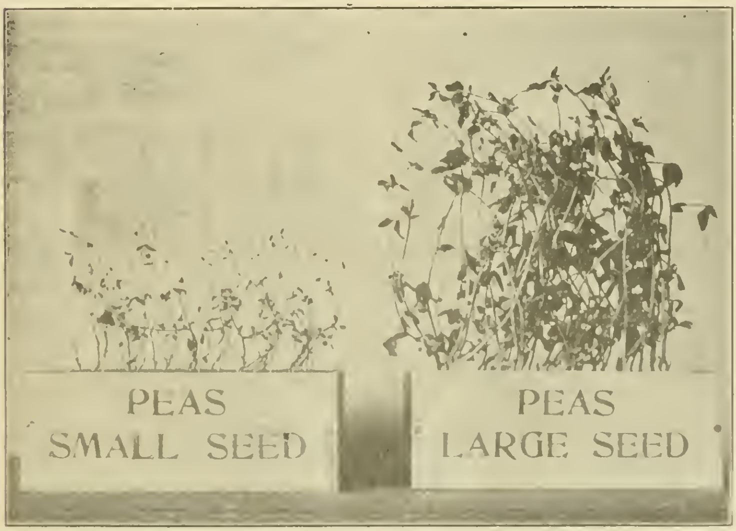
R. Heinrich, of Germany, has made a study of both English and Italian rye grass in order to find out the relation between the weight and the vitality of their seed. The experiment, which extended over a period of fourteen years, shows that the percentage of seed capable of germination increases with the weight of the individual seeds.

At the experiment station at Chappelle, F. Deprez, conducted an experiment with wheat in which he selected large kernels from a crop grown from large seeds and small kernels from a crop grown from small seeds. The average results of the experiment, conducted for three years with five varieties, show that large seed produced larger grain than small seed, and that in every case the large seed gave the heaviest yield of grain. It was also seen that the large grains germinated better and grew more vigorously than the small grains under similar conditions.

Experiments in the selection of seed, conducted in Indiana, Nebraska, Kansas, Minnesota, North Dakota, North Carolina, New York, and in other States of the American Union, show results in favor of large seed, as compared with small seed, for crop production.

This excellent experimental work has been done in trying to find out the influence of the size of the seed upon the yield and the quality of the crop produced. There is yet great room for a more general application of the results of these experiments in ordinary farm operations. The crop producer is certainly not looking closely after his own interest unless he gives close attention to the sowing of nothing but large, plump, heavy seed on his own land.


BARLEY
SMALL SEED
BARLEY
LARGE SEED


PEAS
SMALL SEED
PEAS
LARGE SEED

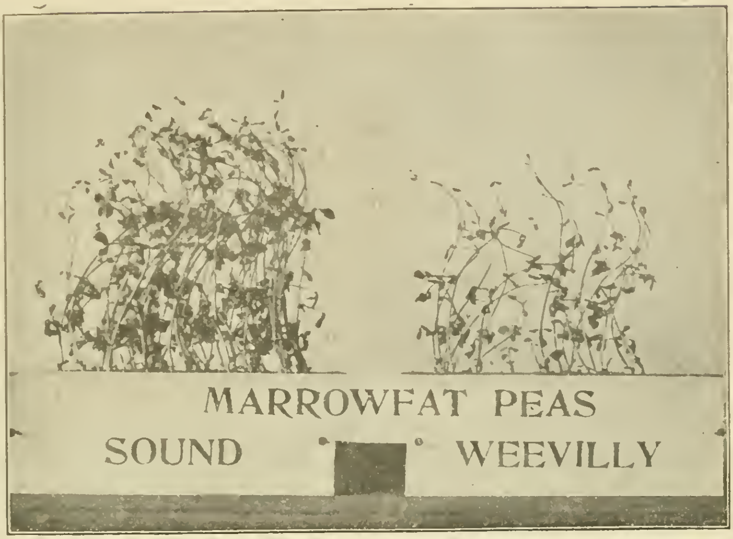
PLUMPNESS OF SEED. Although a large amount of experimental work has been conducted in testing the comparative value of large and small seed, there seems to have been but little done in comparing the value of shrunken seed with that which is plump. Experiments conducted in our experimental department with spring wheat for five years and with barley for four years present some interesting and valuable information in comparing the actual yields produced from plump seed and from shrunken seed of the same variety of crops. It has been found in the average of the five years' experiments with spring wheat that plump seed gave an increased yield of 23 per cent., and a weight per measured bushel of 6.4 lbs. over that of the shrunken seed. In the average of the four years' experiments with barley, the plump seed gave an increase in yield of 19 per cent. and an increase in weight per measured bushel of 1.1 lbs. over that of the shrunken grain. Exactly the same number of grains were used for each selection in the different experiments made. The cause of the grain being shrunken was no doubt mainly from the effects of weakness of straw, rust, etc. The results from sowing plump seed were better in every particular than those secured from using the shrunken seed.

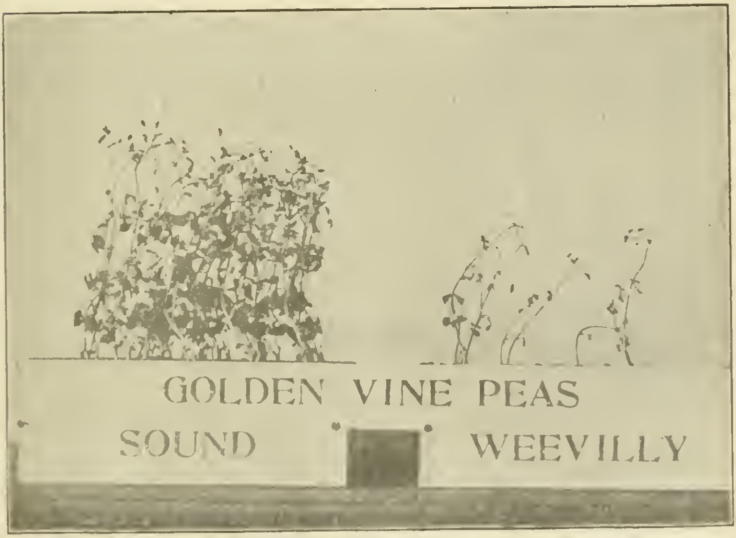
THE DURATION OF THE VITALITY OF SOME AGRICULTURAL SEEDS. The vitality of seeds is certainly influenced more or less by their age. Some classes of seeds seem to lose their vitality much more rapidly than others. It is impossible to secure definite information regarding the duration of the vitality of different classes of seeds which can be used as an accurate guide under all circumstances, as much depends upon the manner in which the seed has been preserved from one year to another. It is claimed that some seeds, such as those of melons, squashes, and cucumbers improve in vitality as they reach three or four years of age. This, however, is not the case with most of the classes of seeds in which the farmer is interested. We occasionally hear of law suits between farmers and seedsmen resulting from the fact that the former purchased from the latter seed which had lost its vitality through age. Experiments have been conducted in different countries by germinating different classes of seeds of different ages in order to get some information as to their comparative vitality at different periods. The results given in the following table have been collected from experiments conducted in Germany and in the United States, and should furnish some valuable information in regard to this important subject.

Percentage of seed germinating at different ages :

Kind of seed.	—	Age of seed in years.									
		One.	Two.	Three.	Four.	Five.	Six.	Seven.	Eight.	Nine.	Ten.
Winter wheat..	A. Burgerstein, (Germany).	100	98	95	94	87	87	85	79	70	75
Rye		96	83	90	78	65	64	36	31	13	2
Red clover	J. Samek, (Germany).	90	90	88	84	74	68	44	16	10	3
Alsike clover ..		73	64	51	37	15	7	6	5	3	3
Alfalfa		94	91	87	75	72	71	68	66	63	59
Timothy		95	90	90	88	86	79	66	39	15	1
Orchard grass..		46	47	44	44	38	29	21	12	8	5
Twenty kinds of garden seeds.	United States	73	73	65	60	46	42	35	33	30	20

In the experiments of A. Burgerstein, the samples were taken from the harvests of 1885 to 1894, and were tested in June, 1895. From 100 to 200 seeds of each lot were tested in every instance, and the percentages given in the table are averages of from one to three tests of each lot. It will be seen that rye began to depreciate very rapidly after it was six years of age, and by the time it was ten years old the seed was almost useless.


MARROWFAT PEAS
SOUND
WEEVILLY


GOLDEN VINE PEAS
SOUND
WEEVILLY

In the experiments of J. Samek, well matured fresh seed was secured and a portion of which was tested during each of the years from 1883 to 1893. The seed was preserved from year to year in a dry, airy room. In most cases the figures represent the average of three samples tested. It will be noticed from these tests that alfalfa was the best in preserving its vitality, and that the others were practically useless for seed purposes when eight years old.

The results of the experiments with American seeds were from twenty kinds of crops, nearly all of which were garden vegetables.

W. Carruthers, of England, conducted an experiment in which he determined the germination of the seed of eighteen different varieties of plants in 1893, and again in December, 1895, and found that in two and a half years the depreciation in vitality varied from 11 per cent. to 100 per cent., according to the class of crop. White clover showed the least amount and sheep's fescue the greatest amount of depreciation.

A committee of the British Association expended much time and money in making a fair and thorough research as to the age at which seeds would grow and published the results of their work. It was found that when seed was three years of age only about three-quarters of the oats, one-half of the corn, millet, wheat, and barley, and practically none of the rye would grow. At the end of eight years only one-sixth of the oats germinated and the wheat and barley were utterly useless as seed.

After carefully conducted experiments, with special reference to the effect of age in deteriorating the vitality of grass and clover seed, Prof. McCarthy, of the Agricultural Experiment Station of North Carolina, makes the following deductions:

1. "Grass and clover seeds deteriorate very rapidly with age and generally are not worth sowing after they are two years old."

2. "Aged and deteriorated seeds are often sold by local store keepers."

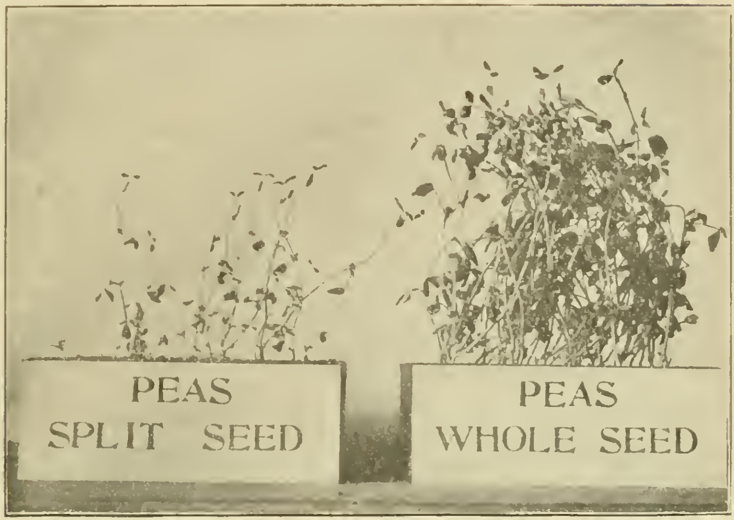
3. "Farmers should test samples before purchasing seeds, and purchase directly from some reliable seed grower or from a local merchant who will guarantee the quality of his seeds."

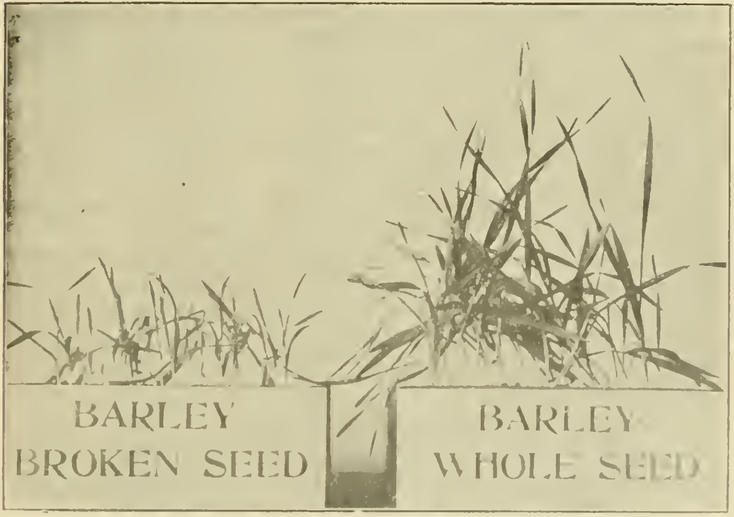
4. "A trustworthy standard of value of seeds with laws, if necessary, to enforce its observance is very badly needed."

FROSTED GRAIN AS SEED. C. de Candolle, in an article in the "American Gardening," gives the results of an experiment in which wheat and oats were subjected to a temperature ranging from 38° C. to 54° C. for a period of 118 days. At the conclusion of the experiment, the seeds were planted and they came up promptly.

It appears that seeds will withstand almost any degree of coldness, providing they are thoroughly dry when subjected to low temperature. As there is a considerable amount of moisture, however, in the seeds of nearly all kinds of farm crops before the grain becomes thoroughly mature, considerable damage may be done by means of frost. As the northern portions of Ontario are sometimes visited by frosts before the crops are harvested, it is well to have some knowledge of the amount of injury caused by frost on seed to be used for sowing. An interesting experiment was conducted by Director Wm. Saunders, Central Experimental Farm, Ottawa, in which wheat, oats and barley that had been frosted was compared in germinating power with sound seed of each of the three classes of grain. The results are given in the following table:

Crops.	Sound seed.		Frozen seed.	
	Samples tested.	Average vitality.	Samples tested.	Average vitality.
Wheat	320	89	221	75
Oats	153	83	21	47
Barley	98	86	17	70


PEAS
SPLIT SEED
PEAS
WHOLE SEED


BARLEY
BROKEN SEED
BARLEY
WHOLE SEED

In regard to this line of investigation, Prof. Saunders writes as follows: "While occasional instances have been reported of good crops being obtained where frozen grain has been used for seed, the bulk of the evidence appears to be on the other side, and few farmers agree to run the risk which always attends the sowing of inferior seed. It was even observed that where frozen grain had a fair percentage of germinating power its vitality was so far inferior that a very weakly growth was made. These weaker plants gained strength and vigor rapidly in the rich soil of the prairies where the weather is favorable, but if unfavorable conditions prevail their growth is usually slow and stunted and the crop uneven in ripening."

From experiments conducted at the Experiment Station in North Dakota in testing frosted wheat, Prof. H. L. Bolley makes the following observations: 1. "The best grades of frosted seed possess less strength in their first growth from the grain than in the case of the best grades of matured wheat." 2. "Wheat which has been wet and subject to freezing and thawing during the winter cannot be safely used as seed without being tested."

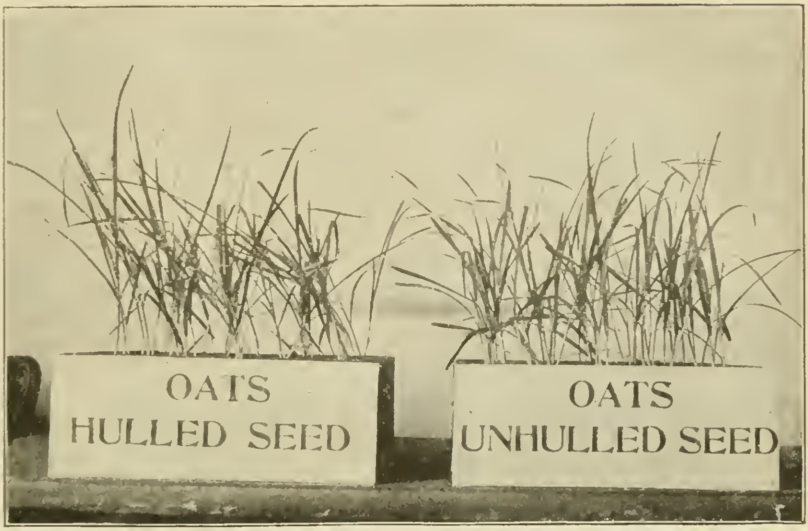
Sprouted Grain for Seed. It is seldom that the season is so wet during the time of harvest that grain is materially affected by sprouting in the head. During the month of July, 1897, however, the total rainfall throughout the central part of Ontario was nearly five inches in depth. The rains during that month were heavy over nearly the whole of the Province, and much of the winter wheat became sprouted in the head, either before cutting or while remaining in the shock. In some parts of Ontario the wheat was so much sprouted that it became a burning question as to the advisability of using sprouted grain for seed. Many farmers who had seed wheat for sale claimed that the sprouted grain would grow as well as that which had not been sprouted.

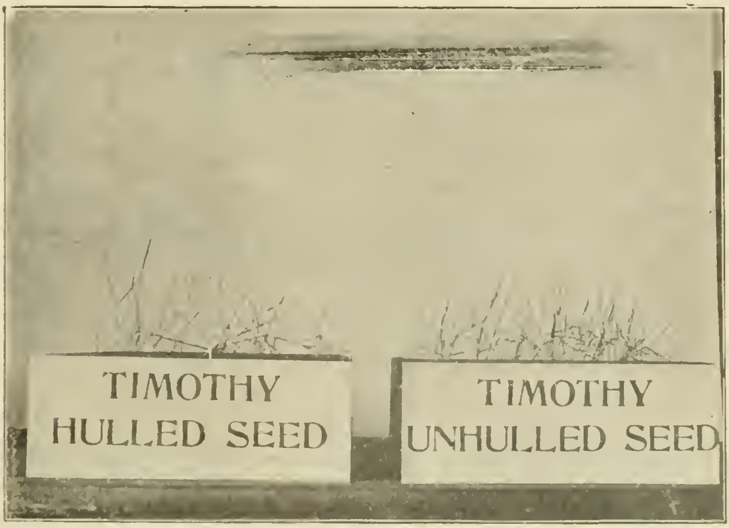
Several experiments were conducted at the Agricultural College by sowing winter wheat which was unsprouted, slightly sprouted, considerably sprouted, and badly sprouted in order to find out the comparative value of each. The results of these experiments were very similar, and clearly showed that the sound grain was the best to germinate and that the badly sprouted grain was the poorest. The results of these experiments can be illustrated by giving the exact record of one test which is as follows: Fifty sound grains were planted in No. 1 box; 50 grains which were slightly sprouted in No. 2 box; 50 grains considerably sprouted in No. 3 box, and 50 grains badly sprouted in No. 4 box. In about two weeks after the grains were planted the crop in No. 1 box showed 88 per cent. germinated and the plants an average of 3½ inches in height; in No. 2 box 66 per cent. of the seeds germinated and the plants averaged 2¾ inches in height; in No. 3 box, 16 per cent. of the seeds germinated and the plants averaged 1½ inches in height, and in No 4 box 10 per cent. of the plants germinated and the plants averaged 1¼ inches in height. The crop from the sprouted seed was uneven in growth, some of the plants being much stronger than others.

Early in September, a practical experiment was started in the field with two varieties of wheat, namely, the Dawson's Golden Chaff and the Early Genesee Giant by sowing sound seed, slightly sprouted, and badly sprouted seed of each variety. Each plot was 10x25 links, and exactly the same number of grains were sown on each. The plots which received sound seed were soon covered with a good growth, while those receiving the badly sprouted seed possessed only a few plants, which were small and weak and became badly killed out during the following winter season.

The results of these experiments go to show that there is a great risk in sowing seed wheat which has been previously sprouted.

Weevilly Peas and Beans In some parts of Ontario, especially in the south western portion of the Province, the injury by the pea weevil (*Bruchus pisi*) is considerable. There seems to be a great difference of opinion in regard to the value of weevilly peas for seed, as seedsmen and others who have seed for sale sometimes claim that weevilly peas will grow nearly as well as sound seed. To illustrate this point we would make the following quotation from a seedsman's catalogue for 1889: "In some seasons, peas are more or less punctured with the pea bug and many judge they are worthless from their appearance. These holes are caused by the sting of an insect called (*Bruchus pisi*) which


OATS
HULLED SEED
OATS
UNHULLED SEED


TIMOTHY
HULLED SEED
TIMOTHY
UNHULLED SEED

deposits its egg while the pod is forming and perfects the insect when the pea is subject to heat after ripening. Strange to say the germ is never destroyed and those which have the largest holes grow equal to the most perfect. We explain this from the fact that we have frequently had customers remark that peas must be bad as they have holes in them."

The above statement is certainly very misleading, as shown by the results of experiments conducted at the Ontario Agricultural College. Four carefully conducted tests have been made by sowing weevilly and sound peas of each of two leading varities, namely, the Marrowfat and the Golden Vine. The results of these four tests were very uniform, and the average results go to show that 59 per cent. of the weevilly peas of the Marrowfat variety, and 87 of the weevilly peas of the Gold Vine variety did not germinate. The peas of the Marrowfat variety being larger in size than those of the Golden Vine, the injury was not so marked. Taking the average of the four experiments with the two varieties of peas, it is found that only about one-quarter of the weevilly peas will grow.

Plots in the experimental grounds have been sown with weevilly and sound peas in each of the past five years, in order that farmers can see for themselves the great difference there is between the growth of the sound seed and that which has been injured by the pea weevil.

At the Kansas Agricultural Experiment Station it was found that out of 500 weevilly peas, including ten varieties, only 25 per cent. grew, while 97 per cent. of a similar lot of sound peas produced good plants. It was found that out of 1,800 weevilly beans only 30 per cent. could be forced to germinate while 95 per cent. of a like number of sound beans grew.

I have no hesitation whatever in saying that the statements made claiming that weevilly peas and beans are as good for seed as those which have received no injury are entirely misleading and do not represent the truth. Not only are the peas which have been affected by the weevil much reduced in percentage of germination, but the plants produced by weevilly peas are usually weak, uneven and unprofitable. In districts where the weevil is abundant, pease should be treated with carbon bi-sulphide immediately after they are threshed. For details of this treatment the reader is referred to the report of the Farmers' Institutes for Ontario for 1896, page 178.

A very simple and excellent way for separating weevilly peas from sound ones is by placing the seed in a solution of salt and water made of a sufficient strength that the sound peas will sink and the weevilly peas will float. The injured grain can then be washed and fed to stock and nothing but the sound seed used for sowing.

BROKEN OR SPLIT SEED.—In the process of threshing, more or less grain is frequently broken unless the separator is watched very closely. A considerable amount of broken barley and wheat and of split peas are frequently noticad in grain offered for sale for seed purposes. In order to get reliable information as to the percentage of broken or cracked seed that is likely to grow, careful experiments have been conducted in our experimental grounds for several years in succession, the results of which should be of practical value.

Sound peas and split peas have been sown on separate plots for five years in succession, in order to find out the actual yield from each selection of seed. These plots have been situated side by side in every instance. There were always twice as many half peas sown on the one plot as of whole peas on the other. The average results for the five years are af follows :

Yield from sound peas......................29.3 bushels per acre.
Yield from split peas...................... 9.8 bushels per acre.

It should be understood that the peas were split with the machine during the process of threshing. It is evident that the germs of the peas frequently became entirely separated from the peas before the seed reached the ground.

A similar experiment has been conducted with barley for four years in succesion by sowing whole grain and grain which had been been broken with the separator. Equal quantities by weight, of whole and of broken grain were used in each test. The average results for the four years are as follows :

Yield from sound barley	42.7 bushels per acre.
Yield from broken barley	34.2 bushels per acre.

The injury of seed caused by the breaking of the barley does not seem to be as great as that caused by the splitting of the peas. The barley is nearly always broken across the grain, and consequently the germs of the seed are injured to a less extent than in the case of the peas.

These experiments go to show that in order to get the best results it is advisable to prevent seed grain from becoming broken or split or to entirely separate all broken grains from the sound seed before sowing.

THE COMPARATIVE RESULTS FROM HULLED AND UNHULLED OATS AND TIMOTHY. As more or less of the oats and timothy are hulled in the process of threshing, enquiries have been made regarding the comparative values of the hulled seed of these crops, as compared with that on which the hull still remains. In order to get some information on this point an experiment was started at our Agricultural College in 1893 by using samples of heavy, light and hulled oats of the Joanette variety. This experiment has now been conducted for five years in succession—the different selections being made each year from the product of similar selections of the previous year. The results go to show that the hulled oats have given an average of 4¾ bushels per acre less than the heavy unhulled seed, and an average of 6 1-10 bushels per acre more than the light unhulled seed. In weight per measured bushel the crop from the hulled seed gave an average of 1-5 of a pound less than that of the heavy unhulled seed and 2½ pounds more than that of the light unhulled seeds. This shows that the hulled oats gave very good results, as a person would naturally expect, when he considers that only the plump kernels would become hulled in the process of threshing.

This experiment also shows that the hulled oats which have been grown for five years in succession produced a crop in 1897 which had about 16 per cent. more hulled oats than the crop produced from the unhulled seed of the same variety. The threshing of the crop from each selection of seed was done precisely the same. This experiment will likely be continued for several years more in order to find out whether the hulled oats will eventually produce a variety entirely free from hull.

The writer has received samples of timothy which have been considerably hulled in threshing. Some of these samples have been germinated, and, while there is not much difference in the vitality of the hulled and unhulled samples, what little difference there is, is in favor of the seed which has retained its hull.

In an experiment conducted at the Experiment Station in Wisconsin in 1890, it was found that the hulled grains of timothy seed did not germinate as well nor retain their vitality as long as those not hulled. The difference, however, between the two selections of seed was not very marked when the samples were tested immediately after being thrashed.

GERMINATION OF SEED AS AFFECTED BY DEPTH OF PLANTING.

It sometimes occurs that large, sound, healthy seeds are prevented from germinating from the simple fact that they are placed in the soil at an improper depth. The proper depth to plant seeds will vary more or less according to the quality, the temperature, and the moisture of the soil. When seeding takes place very early in the spring it is usually advisable not to plant as deeply as when seeding takes place later in the season when the ground becomes warmer and drier. It is also true that some classes of seed require much deeper planting than others.

Experiments have been conducted at the Ontario Agricultural College by planting the seed of each of six different crops to the depth of one inch, two, three and four inches in the soil. Some of these experiments have been conducted for only one year, while others have been repeated for two or three years in succession. The seed of the various crops were sown at the dates when the seeding of the respective crops usually takes place in the regular farm practise in Ontario. The following table gives the results of these experiments :

Crops.	Years of experiments at O. A. C.	Yield in tons per acre from different depths of planting.			
		One inch.	Two inches.	Three inches.	Four inches.
Corn	3	17.4	17.4	16.3	....
Swedish turnips	3	16.5	13.1	3.7	1.4
Fall turnips	2	22.7	20.0	9.8	1.1
Mangels	1	43.5	41.6	18.0	7.3
Sugar beets	1	37.5	28.4	10.4	1.7
Carrots	1	31.2	15.2	8.2	5.9

It will be observed from the above table that corn was not planted to a greater depth than three inches. In every instance the shallowest planting gave the best results, with the single exception of corn, which gave equal results from the planting of one inch and two inches deep. By averaging the five classes of roots, it will be found that those planted to a depth of one inch yielded 30.3 tons ; two inches, 23.7 tons ; three inches 10.0 tons ; and four inches, 3.5 tons per acre.

At the Michigan Agricultural College an experiment was conducted in 1895 by sowing wheat, oats, flax, corn, barley, clover, peas and buckwheat at eight different depths in sand, loam and clay. The highest average percentage of germination was obtained from planting barley one-half inch deep ; wheat, corn, clover and flax one inch deep ; oats and buckwheat two inches deep, and peas four inches deep. The clover failed to germinate when planted below two inches, while nearly fifty per cent. of the peas germinated at a depth of one foot from the surface.

Guarantee of Seed. Many of the European seedsmen guarantee all the seed sold by them. This places the seed trade upon a good foundation, and protects the honest and careful seedsman from the unfair competition of the unscrupulous. The following form of guarantee given by an English seed association may be quoted as an example :

1. " Our seeds are sold guaranteed pure, clean and of the percentage of vitality named in our catalogue."

2. " This guarantee is subject to the analysis of the botanist of the Royal Agricultural Society."

3. " If the result of the analysis does not confirm the above guarantee, the association will take back the seeds and pay cost of carriage both ways, but seeds must not be sown before making complaint."

4. " The seeds once sown, the responsibility of the association ceases. The results depend upon so many things besides the quality of the seeds that the growth cannot be guaranteed."

Conclusion. Good seed is at the foundation of good farming.

THE CROSS-BREEDING AND HYBRIDIZING OF PLANTS, WITH ESPECIAL REFERENCE TO CEREALS.

By W. T. Macoun, Horticulturist, Central Experimental Farm, Ottawa.

During the past one hundred years, but especially during the last fifty, much attention has been given to the improvement of plants by artificial cross-fertilization and hybridization. The wonderful results obtained by horticulturists have led scientific men to more thoroughly investigate the causes and laws which govern the origin of new varieties; to determine why the species and varieties existing in nature are seldom intercrossed or hybridized; and why they maintain their vigor and productiveness.

At the outset, an explanation may be necessary as to the terms "cross-bred" and "hybrid," and "cross-breeding" and "hybridizing." A cross-bred grain is the offspring of two plants of the same species, as Red Fife wheat and Colorado wheat. A hybrid is the offspring of two plants of different species, as rye and wheat. Cross-breeding is the process of making a cross; hybridizing is the process of making a hybrid.

Means by which Flowers are Fertilized in Nature.

Before proceeding to discuss the methods of cross-breeding and some of the results it may be well to explain the several ways in which plants are fertilized in nature. By examining the flowers of plants in different families, genera, and species, it will be found that they seem to be especially adapted either for self-fertilization, fertilization by wind, or fertilization by insects. By far the largest proportion of flowers appear quite capable of self-fertilization. To this class belong all those whose anthers are in such close, unobstructed, proximity to the stigma that it seems impossible for the flower to escape fertilization when the pollen is shed.

Flowers which seem best adapted for fertilization by wind are usually diœcious (that is, flowers of opposite sexes growing on different plants) or monœcious, (that is, flowers of opposite sexes growing on the same plant). It will be remembered that these kinds of flowers have usually a very abundant supply of pollen, much of which is necessarily wasted in passing through the air. It is a remarkable fact that a very large proportion of the species with diœcious flowers, or flowers that are fertilized by means of the wind or insects are trees; apparently indicating that nature has given this method of reproduction to the most permanent species, which would continue to live even though one season were unfavorable for the production of transmission of pollen. The pollen, also, maturing on trees, would be scattered by the wind more freely than on most plants which were nearer the ground. Another very noteworthy fact is that those trees which are commonest and most widely distributed are fertilized by this method; examples being: willows, poplars, birch, oak, pine and ash. Some of the grasses are also fertilized in this manner, especially such as grow in meadows or bogs, where the flight of pollen is rendered easy.

With regard to those plants apparently adapted for fertilization by insects, there is considerable dispute. On orchids especially much has been written, partly from observation, and partly from imagination. The room for imagination is very large, and one could take a flower in his hand and describe all the movements of an imaginary insect necessary to the fertilization of the flower. The structure of orchids is so varied that it requires a different species of insect for nearly every kind of orchid. It appears, however, from the writings of accurate observers, that the bee must play an important part in the fertilization of orchids. Other flowers are also apparently more adapted for fertilization by insects than by any other method. Much attention is being paid now-a-days to the fertilization of apple blossoms, it being believed that insects do much towards ensuring a good crop of fruit. Among strawberries also they are invaluable, and without their aid and that of the wind many varieties would not set any fruit.

The several means by which the fertilization of flowers is effected has also been the subject of careful study by able men. To Darwin we owe, in a large measure, many of the well founded theories now almost generally conceded by those who have investigated the subject. By means of carefully conducted experiments, he clearly proved important facts, some of which had hitherto not been apparent.

Some of Darwin's Experiments in Cross-fertilizing Plants.

Darwin carried on a very elaborate and carefully conducted series of experiments, extending over ten generations of plants, and the results and conclusions arising from them are very important. What he wanted to determine was why the vigor of wild plants was maintained from year to year, from the standpoint of their fertilization. The following are some of the startling results he obtained by fertilizing flowers with their own pollen, and by fertilizing flowers with pollen from different plants of the same species or variety, grown under the same conditions :

Out of fifty-four species of plants in an experiment carried on for several seasons there were thirty-seven species in which the height of cross-bred plants exceeded the height of those self-fertilized by twenty-two per cent., and the average or the whole fifty-four specimens was thirteen per cent

In another experiment, where he compared self-fertilized plants with plants whose parents had been fertilized by pollen from fresh stock (that is, plants which had been grown under other conditions), the results were still more marked, as the average was one hundred to seventy-four in favor of the cross. This experiment was conducted with thirteen species, comprising twelve genera. Besides this, his results showed that crossed plants produced more seed, were hardier, endured more extremes of weather, flowered and more vigor was maintained through succeeding generations.

He also proved that if pollen of a different plant of the same species were applied, as long as twenty-four hours after its own pollen had been shed on the stigma, the foreign pollen would destroy the effect of the other, showing that nature has provided that a very large proportion of plants are not intended to be self-fertilized. This would also seem to prove the very great assistance insects play in the maintenance of vigour in plants.

These are some of the important facts proved by Darwin, and in fact by some of his predecessors.

Improvement of Fruits, Flowers and Vegetables by Cross-breeding and Hybridizing.

Much work has been done in the cross-fertilizing and hybridizing of fruit ; grapes especially having received considerable attention in this regard. The Rogers' hybrid grapes have been long and favorably known and need no description. Apples, pears, plums, gooseberries, and currants also are all parents of new varieties originated in this way.

The improvement in flowers by artificial cross-fertilization and hybridization has been very remarkable. Some of those which have been improved in recent years being roses, cannas, carnations, fuchsias, begonias, sweet peas, cinerarias, aquilegias, delphiniums, gladioli, clematis, geraniums, etc.

Up to the year 1877, one could count the number of varieties of sweet pease on his fingers, and to-day they can be counted almost by the hundreds in many shades and markings, which have led to the sweet pea becoming one of the most popular flowers of our time. The roses grown in our gardens to-day, known as the hybrid perpetuals, are the outcome of patient labour by enthusiastic workers, and the graceful outline, the delicious fragance, and the delicate tints of these charming flowers all attest that the labour in originating them was not in vain.

The range in the shades and markings of the geraniums which make our homes attractive in winter, have been brought about, in a large measure, by artificial cross-fertilization, and we have to-day a great number of choice varieties to choose from.

While the improvement of flowers has been very marked during the last half century the improvement in vegetables has been scarcely less so, and while this has been due in a large measure to selection rather than to artificial cross-fertilization, still much work has been done in that line. The ease with which the flowers of most vegetables are intercrossed by nature in the field renders the offspring very liable to sport or differ from the main strain, and new types are easily selected.

The Cross-breeding and Hybridizing of Grain at the Central Experimental Farm.

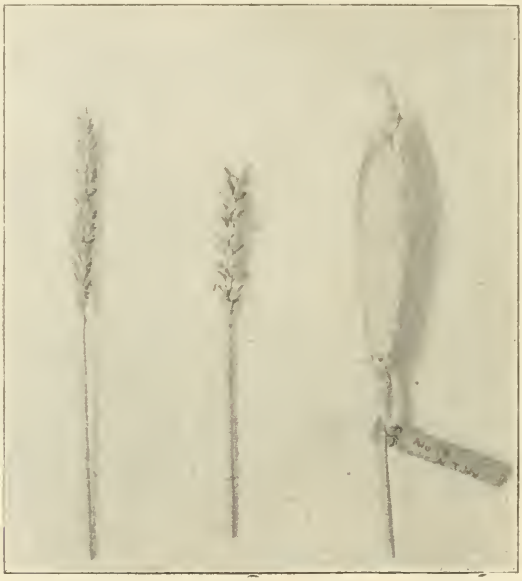
In the artificial fertilization and hybridization of grain much valuable work has been done, and while the first systematic work in this line was probably begun in France, there are workers now in England, Australia, United States and Canada, and we are pleased to say that not a little of this good work has been done at the Experimental Farm at Ottawa, by and under the directions of Dr. Saunders. The prime object of this work was to try and produce a wheat which would be suitable for Manitoba and the North-west Territories; afterwards the endeavour was made to originate varieties which would be especially adapted to all the provinces. Oats, barley, peas, corn and rye were finally added, until over 600 new cross-bred varieties were originated, at the Central Experimental Farm at Ottawa, and at the other Experimental Farms. A large number of these have been tested in different provinces of the Dominion, and for the past three years one of the wheats, the "Preston," has given the highest average yield out of thirty-eight named sorts. The "Royal" barley has averaged third out of thirty-five varieties. The "King" pea yielded the highest in 1897 out of forty varieties, and the "Holland" oats gave the best returns from more than sixty varieties. Many other sorts also have done remarkably well, all showing that the labour has not been in vain, and that there is reward for perservance.

One of the principal reasons why varieties of grain run out so soon is probably that oats, wheat and barley are being continually inbred in nature, and the result is that, like animals, their vigour and productiveness decrease, unless the seed be very carefully selected each season, which is not often done. The different varieties of wheat, barley, oats and pease probably never cross naturally in the field. The flowers are so protected that it is next to impossible for foreign pollen to reach them; hence, if new blood is to be infused into a variety it must be done by artificial cross-fertilization. This cannot be done until the head is carefully examined, the flowers found, and the male and female organs distinguished.

How Grain is Artificially Cross-fertilized.

A short time after a head of wheat shoots out it will be in flower. With a pair of fine forceps open the coverings which hide the cavity where the future grain is to be, and the flower will be revealed. It is a tiny thing with a little double plume-like centre, with three greenish or yellow masses surrounding it, raised on slender stems. When ripe these little masses, which are the male organs of the flower, shed fine dust or pollen on the plume-like part, which is the female organ. The grain is thus fertilized and a kernel of wheat soon begins to develop. The time to operate is before the pollen is shed, if artificial cross-fertilization is to be performed. Experience will teach when a flower is just in the right condition to be operated on. With forceps nip off the three little bodies (anthers) supported on their slender stems (filaments), when beginning to turn yellow or when still green, and throw them away. This should be done carefully, as if the plume-like body (stigma) be injured, your labour will be for naught. What has been done with one flower is done with as many of those on the head as is deemed advisable, and the rest should then be pinched off, so that only the flowers used in crossing remain. Then, after covering the head to keep insects away, go to the variety of grain that you desire to inter-cross, and search for a flower whose pollen is just been shed. Take this pollen, or the mass from which it is issuing, and rub it lightly over the plume-like body of each of the flowers on your other plant, and the operation is complete. Light tissue paper should then be tied neatly around the head to prevent insects from entering. A label with a number is tied on the stalk, and the stalk fastened to a slender stick to prevent its breaking, the plant being thus left until harvest. As soon as the operation is completed, take a record in your note book of the names of the parents, the number of flowers operated on and how the plant can be distinguished from any others you may work on. When ripe the kernels should be shelled out, put in envelopes with particulars regarding the cross or hybrid written on the outside, and carefully put away until the following spring, when they should be sown about six inches apart in well prepared soil.

From each kernel that grows there will be a plant bearing several heads. The grain from every kernel sown should be kept separate, as each one has an individuality of its own If the parents were wheats, one of which was bearded and the other beardless, many intermediate forms will be had with more or less beard. If the colour of the chaff of both parents be different, the chaff of the crosses will vary. The grain also is likewise affected.



A. B. C.

A. Head of wheat before crossing.
B. Head of wheat after crossing.
C. Head of wheat as left until harvest, after crossing.

The next season, the grain grown from each of the original kernels should be sown thinly, and kept separate and at harvest time, those plants selected from the different plots which have the most good points, the rest being discarded. The third season the same operation is continued, and so on until there are no more "sports"—plants differing from the type selected—which will usually be the fourth or fifth year, when the type may be considered fixed, and can then be multiplied as fast as is desirable.

At the Experimental Farm the progeny has differed very much in many cases from both of the parents. Take, for instance, the "Preston" wheat, which has done so well in different parts of the Dominion. It is a cross between the Ladoga and Red Fife wheats, and is a bearded white chaffed variety. The Ladoga is a bearded, red-chaffed sort, and the Red Fife is a beardless, white-chaffed variety. The Preston wheat is, at Ottawa, a stronger grower than either of the parents, and a better yielder. It is a little later in ripening than Ladoga and earlier than Red Fife. Some very interesting hybrids have been originated by using two-rowed and six-rowed barleys as parents. The object in this work was to produce a barley with a longer head than the ordinary six-rowed, a stiffer straw than most of the two-rowed sorts, with their stooling characteristics. The "Royal" and "Trooper" barleys are two of the best of those obtained.

In oats, also, considerable work has been done, and the crossing of sided and branching varieties has produced forms half-sided and half-branching. One of the crosses, the "Holland", out-yielded by thirteen bushels over sixty varieties, at the Central Experimental Farm in 1897.

Peas have also had their share of attention, and many useful and interesting crosses have been originated. The principal varieties used as parents were Mummy, Multiplier, Large White Marrowfat, and Black-eyed Marrowfat. Some of these crosses have out-yielded the ordinary varieties under the same conditions, and give promise of continuing to do so.

A hybrid between rye and fall wheat was obtained one year, a single grain having formed from a large number of flowers fertilized. This grain was sown the following spring and a fine, strong plant with several peculiar heads was the result, but no grain was found in the heads, so that the variety was not perpetuated, the heads only, now remaining as proof of the hybrid.

Crossing and hybridizing should be done with judgment. Know what you desire to obtain before you begin the work, and use those varieties which, when combined, will be most likely to produce the results you are seeking. At the Experimental Farm there has not yet been much proof of the different influences which the male and female parents exert on the offspring, although there are certain theories regarding the subject, so that to obtain required characteristics it, apparently, does not matter which variety is used as the male or female parent.

Artificial cross-breeding and hybridizing is one of the most fascinating employments, and once the work is begun it is remarkable how interested one becomes in the results which, with grain, are soon apparent. Every farmer should try a little of this sort of work each year. He might produce a variety which would repay him many times over for his time and trouble.

PARASITIC FUNGI.

By J. Dearness, I.P.S., Lecturer on Botany, Western University, London.

It is often remarked that a balance is maintained in nature by the reciprocal vital processes of plants and animals. The remark is intended for a popular expression of the fact that animals inhale and consume oxygen and give back to the air a gas called carbon dioxide, while plants inhale carbon dioxide and give off oxygen. The accumulation of carbon dioxide in the air would be injurious to animal life, but plants take that gas and convert it into starchy products, which in turn serve the animal as food. As a lower proportion of oxygen enters into the composition of these vegetable products, such as starch, than is needed to form carbon dioxide, the surplus oxygen is returned to the air. In this connection it is interesting to contemplate that the energy we call light and heat emanating from the sun is caught and stored as latent or potential energy by the plant in its compounds—starch for example—and this energy is released, *i.e.*, made active or kinetic by the animal and exhibited as animal heat, muscular energy, etc.

A more scientific statement of the proposition with which we set out would be that green plants maintain the balance spoken of as against all other plants and all animals. A substance called chlorophyll, sometimes masked with yellowish, bluish or reddish shades, gives the green color to plants. Under the microscope the chlorophyll may be seen in the plant cell as numerous green spheroid bodies or bands. It is in these chlorophyll bodies that the carbon dioxide in the presence of sunlight is digested, and starch consequently produced. Now there are thousands and tens of thousands of species of plants that contain no chlorophyll. These cannot digest or subsist solely upon inorganic food, and hence they depend to a greater or less extent upon the organized products of animals or mainly of other plants. Nearly all of these non-chlorophyll plants are popularly known as fungi.

The study of the life-histories of a number of these fungi has brought to light a curious and interesting diversity in their food, habits and methods of reproduction. Some of them draw their sustenance only from living plants—their hosts—and die with the plant whose death they may or may not cause. Such are called parasites, and are distinguished from parasites that spend part of their existence on a living plant and then migrate to dead tissues. Some parasites migrate from one living host to another. For example, the red rust of the apple and thorn migrate to the red cedar and there produce peculiar growths known as cedar apples. The great majority of fungi derive their nourishment from dead inorganic matter and are called saprophytes (*sapros*, rotten). The latter, except the few that are edible or poisonous, such as mushrooms, morels, amanita, etc., attract little attention.

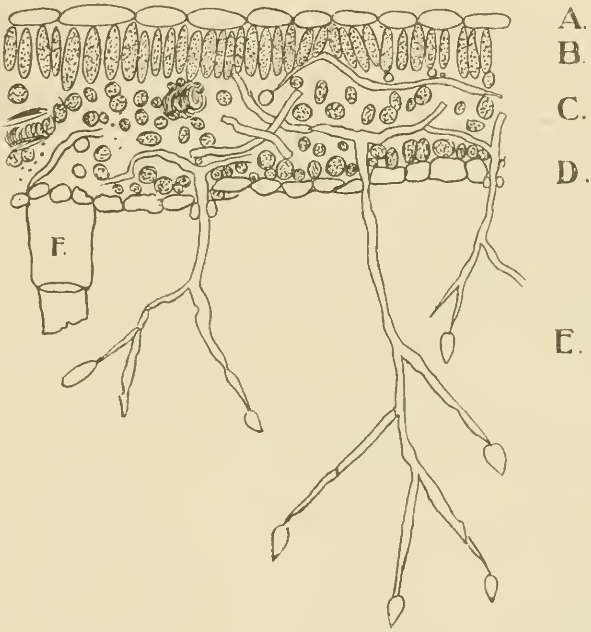
An interesting and practical study is the effect of the various parasites on their host plants. Some of them seem to go into a sort of partnership resulting in mutual benefit. The lichens are now supposed by many observers to be the result of such joint housekeeping. Protomyxa, a fungus producing whitish nodules on the roots of clover, peas and other leguminous plants, is supposed to "pay for its keep" by arresting and storing free nitrogen. Many parasitic fungi appear to affect their hosts but slightly, probably only to the extent to which they draw on the sap of their hosts for nourishment, while others set up morbid processes—for example, black-knot of the plum, which causes such abortion and degeneration of the cambium layer as to kill the branch which it encircles, or the rust on oats, wheat and other grasses whose fruiting hyphæ and spores fill the stomata and shut off respiration, thus simultaneously robbing the oats, etc., of their sap and hindering their vital processes by partial strangulation. Other fungi in addition to the injuries mentioned above probably by their metastatic products set up a fermentation or putrefactive decomposition in their hosts.

To the last class belongs the fungus that produces soft rot in the potato—*Phytophthora infestans* (de Bary)—one that in 1897 caused great loss to the potato growers in this township and other parts of the county. (The specimens and microscopic sections exhibited were collected in this township—Dorchester, in the first week of last September.) The fungus is visible to the naked eye as a slight whitish mould chiefly on the under side of the leaves and around the petioles. The main part of the fungus grows as so many roots or branches, called hyphæ, through the tissues of the leaf, and the mould that may be seen consists of the fruiting hyphæ that have grown out through the breathing pores of the leaf. These fruiting hyphæ rapidly produce spores which are caught by the wind and disseminated far and wide ; those falling on leaves of potato or tomato in damp weather, when conditions of temperature are favorable, quickly germinate and extend the disease. Accounts of the speaker's own observations were related to show with what surprising rapidity the fungus will spread through a field, and one account was quoted which testified that an excellent crop of twenty acres in a period of three days had been converted into an area of blackened, decomposing, ill-smelling herbage. One microscopic section of leaf exhibited showed on an area of 0.81 square millimetres forty-three hyphæ ; on an average these indicated the production of eight spores each, and each spore is capable under favorable conditions of producing five or six zoospores, each of which can start the disease. An approximate calculation shows that from one square inch of potato leaf there could be produced 1,375,000 germs, enough to give 250 germs for every hill of potatoes on an acre of ground.

The microscopic sections illustrating the curious life-history of the potato-rot fungus was supplemented with blackboard drawings. The conjugation of the so-called sexual branches producing the resting spores which carry the fungus over from season to season was illustrated by the process in an allied genus.

Owing to the suddenness of the attack of this fungus, its method of growth in the tissues inside of the leaves and stems and its fruiting chiefly on the under surface of the leaves, efforts to combat it must be mainly preventive rather than curative. Early planting on well-drained ground in hills or drills as far apart as practicable and liberal "hilling up" are favorable conditions for the potato crop menaced by a shower of the spores of this fungus. Moisture is necessary to their germination. The drier and airier the stratum in which the potato tops are growing the better their chances.

So far as time permitted, the life-history of the common smuts was exhibited. The smuts of wheat and oats enter the host at or near the crown of the root; their hyphae grow up through the stem and produce their fruit in the flowers and young milk kernels of their hosts. The illustrations of the life-history of these smuts showed what an extremely slight chance a smut-spore has of gaining entrance to a host to which its peculiarities of growth are adapted. The spores of smut of wheat and oats carried by summer winds do not like those of the rusts and the potato-rot fungus,, affect the similar crops in adjoining fields.



Section through leaf of Potato affected by the Potato Rot Fungus, *peronospora* (phytophthora) *infcstans*, de Bary.

A—Upper surface of leaf, a layer of tabular transparent epidermal cells. B—A layer of green palisade cells. C—A stratum of greenish cellular tissue interspersed with fragments of vascular tissue and hyphæ of the fungus. D—A layer of transparent epidermal cells on the under side of the leaf showing three breathing pores through which fruiting branches of the fungus have grown downwards. E—Fertile branches of the fungus bearing spores. F—Part of a leaf hair

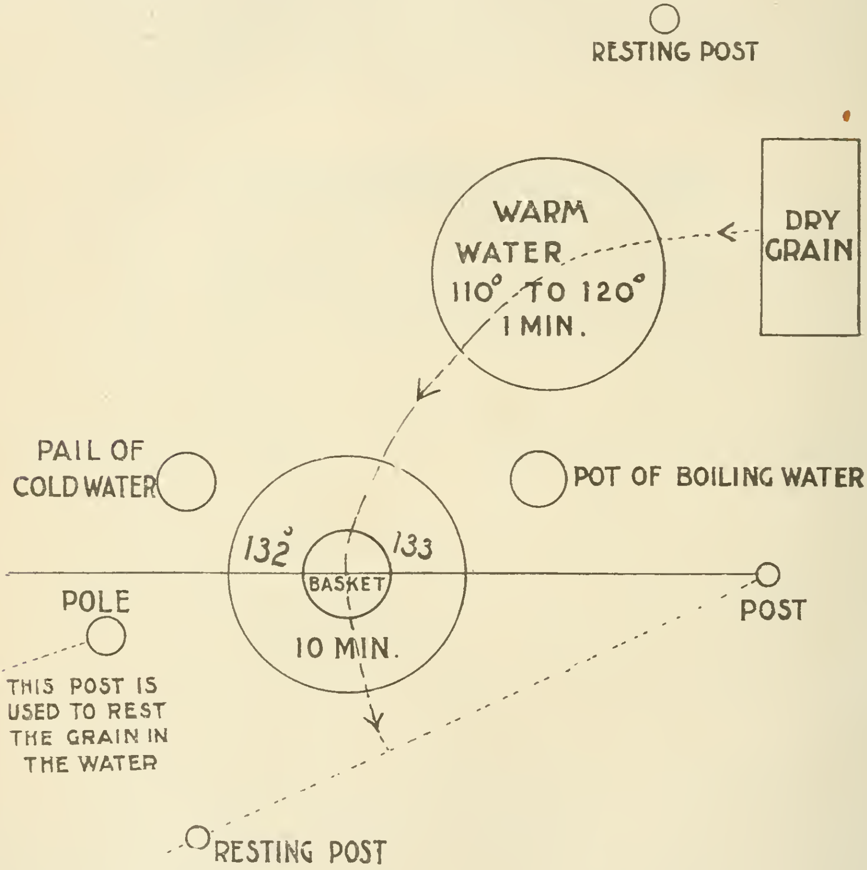
Although these smuts are the most controllable of all the serious fungus-pests, yet they annually cause a very great loss. (A quotation from an American bulletin was read estimating the annual loss to the United States from oat smut alone of $18,000,000.)

If a plant, say of oats, be smutted, the inoculating spore must have germinated within a minute fraction of an inch from the caulicle of the seedling, and that at nearly the same time as the germination of the seed. That smut spore must have remained in the ground from the preceding crop, or have been carried out with manure or most probably have adhered to the seed when it was sown. The first mentioned possibility suggests rotation of crops, and the last the fungicidal treatment of the seed before sowing. Experiments abundantly prove that there is slight, if any, loss by smut from seed that has been properly treated.

The writer quoted from and commented upon various experiment station reports as to the best means of treating seed of oats and wheat. The most strongly recommended methods are :

1. For oat smut.—Soaking the seed twenty four hours in a three-quarters per cent. solution of potassium sulphide, approximately 1¾ lbs. of potassium sulphide in 25 gallons of water.

2. For stinking smut (also called hard smut and bunt) of wheat and oat smut, immersing the grain in hot water, 132 to 133 degrees Fahr., for ten to twelve minutes.



For this process it is recommended to use two kettles, the first kept at about 100 to 120 degrees in which the grain is plunged and stirred for a minute or two to warm it ; then it is plunged and lifted five or ten times in the 132° water, keeping it in the water at least ten minutes. The repeated plunging and lifting is to stir the grain and force currents of the hot water through it so that it be all uniformly heated. The seed is immersed, a half-bushel at a time, in a three peck or bushel basket lined with wire netting or in a sack of loose coarse texture. The water must be maintained uniformly at a temperature never varying more than from 130 to 135°. To maintain this heat have a supply of boiling water and another of cold water at hand. Mr. W. T. Swingle recommends an arrangement of kettles illustrated in the accompanying diagram. The labor is lightened by carrying the dipping basket on a pole as indicated.

When treating wheat for stinking smut it is advisable to first stir it in cold water and skim off the material that floats.

3 For soft or loose smut of wheat, Mr. Swingle's report recommends soaking for four hours in cold water, setting aside for four hours in wet bags and then immersing as above, in hot water 132 to 133° but only for *five* minutes.

4. Covered barley smut and stinking smut of wheat may be treated effectively by soaking twelve hours in bluestone water, made by dissolving a pound of bluestone (copper sulphate) in 25 gallons of water, and then immersing for a short time, five or ten minutes, in lime water (1 lb. unslaked lime in 10 gallons of water.) In directions issued by the U. S. Department of Agriculture it is stated that the copper sulphate treatment should never be used on oats.

THE FARM A SOURCE OF INCOME.

By Prof. I. P. Roberts, Cornell University, Ithica, N.Y.

A natural, comfortable home must be secured from the products of field and stable with a reasonable expenditure of physical energy, or farming in its highest sense is a failure. In addition, farming must give fair opportunity for training and educating families for intelligent citizenship and happy and useful lives, with a surplus each year, that provision may be made, so far as possible, for old age and unseen contingencies.

The census report does not give the number or value of the great men and noble women which the rural homes have produced, though they are the most valuable product of the farms. It says nothing about the perennial rural springs from which flow, in a never ending stream, statesmen, divines, missionaries, teachers, students, and business men. Although more than half of these life-giving energies of the nation and civilization come directly from the rural homes the census report gives no clue to the source or value of these, the nation's wealth and power.

Unfortunately, we are so short sighted that the present—the dollar—blunts the appreciation of the higher and more enduring values which are the fruits of well conducted farms. This being so, of necessity, much stress must be laid on immediate benefits which flow from a well ordered farm life.

While it is not proposed to write of the details of farm management along the lines of greatest financial results, yet something must be said, at least in general, about the methods most likely to produce the necessary competence. A fairly liberal income and financial reserve gives, or should give, some leisure. Leisure gives opportunity for study and recreation, without which life becomes one ever revolving round of work and results in producing an automatical animal. If this is to be avoided, far-reaching plans must be laid, energy directed into its most efficient channels, and time and resources economized. All this implies training and education directed, primarily, along the lines which broaden and enoble, and also along the lines of the occupation followed.

For centuries the higher education has been directed along the lines of the humanities, while education along technical and non-professional lines, until recently, has been conspicuous by its absence. Prior to the present century what provision was made for learning how to direct energy to accomplish its highest results? What provision for co-ordinating the hands and intellects of the industrial classes? None at all. Is it any wonder, then, that the farmer and mechanic, until recently, received but meagre rewards for their efforts?

All this is now changed. Already the industrial classes are enabled to secure far more of the necessaries and luxuries of life for a given period of work than could their ancestors In every province, state and territory in America one or more colleges or experimental stations have been equipped and endowed "to teach," among other things, "such branches of learning as are related to agriculture . . . . *in order to promote the liberal and and practical education of the industrial classes in the pursuits of life."*

In addition to this provision, the Congress of the United States gives to each state and territory $15,000 annually for conducting investigations in agriculture. The Federal Government has supplemented its benefactions of 1862 by appropriating annually to each of the Land Grant colleges $25,000 for the purpose of strengthening the colleges or departments of Agriculture and Mechanic Arts. Most, if not all, of the states have made appropriations to these colleges—in some cases very liberal ones. What a change has been wrought during the nineteenth century in the opportunities provided for securing training and knowledge along industrial lines, especially Agriculture and Mechanic Arts! At first, as might have been expected, there was a strong prejudice against these colleges devoted to the improvement of the industries and those engaged in them, but this has nearly disappeared.

It has been thought strange that farmers did not more quickly see and appreciate the valuable opportunities offered for their children. But why should they at once appreciate and value the princely provisions which were being made for them? From no opportunity for education along the lines of their profession, following a more or less despised calling, from being the butt and jest of those who had had educational advantages from time immemorial, how could they at once understand the value and far-reaching effects of the new order of things? Then, too, these liberal provisions were made somewhat in advance of the times. The pioneer must first redeem the land from the wilderness, fight the physical battles and endure the hardships of a new country.

Nearly all of these primeval conditions have passed away, and the farmers' children are striving to bring their profession up to a high intellectual plane, and make it a delightful and honorable calling. The evolution from the primitive to the complex, from the age of toil to the age of thought, from excessive muscular effort to a more intelligent direction of energy, from the narrow and prejudiced to the broad and liberal, from the coarse and ugly to the refined and beautiful, is being felt and, in part, realized. What happier task than the effort to give direction and help, sympathy and encouragement to these new-born desires? The part which the youths on the farm are taking in this evolution leads naturally to a higher intellectual plane, and hence to a more rational understanding and fuller comprehension of what the rural home should be. This desire to gratify the love for the true and beautiful, which has been growing up by reason of the better education, leads directly to the securing of an income sufficiently large to gratify the more refined and newly acquired tastes.

Take the rural people as we find them, with added wants and new aspirations, and with a somewhat better understanding of the value of a more extended culture, it will be seen that a more rational system of agriculture, a more economic expenditure of energy and a clearer comprehension of the highest and most economical use of money must be secured if the objects sought are attained. To secure the results desired, it must be shown how a competence can be secured without *toil* and with less work, how the results of work may be put to the best uses, and last, but not least, it must be shown what is really valuable, what real, what substantial, what polite, what beautiful, what worthy of intelligent Americans. On the other hand, vulgar display must be shown to be vulgar, shoddy unmasked, the effect of aping the uncultured rich set forth, and that which is unreal and that which goes for naught but vanity displayed under their true colors that comparisons may be made, that truer conceptions of life, its duties and obligations may be secured.

What are the elements, the sure foundations of success? How may a competence be obtained? Briefly, by securing a knowledge of the laws which govern the business or undertaking entered into, and by conducting the business or undertaking in obedience to the modes of action or laws which apply to the specific case in hand. What are some of the dominant laws which should govern the farmer and farm practices? The farmer should specialize along those lines for which his tastes and training, in part at least, fit him. To be more specific, a farmer will show you his potato patch with pride, but not a word will be said about his work animals and their offspring, which look like Barnum's woolly horse. It may be said that "the breath of this farmer is death to a horse."

Then the first principle of agriculture is "follow up successes." In this case the man has land and skill which should lead him direct to success. Why not each year double the output of potatoes and let some horseman breed the horses? I have no ear nor taste for music; why should I spend time in thrumming a piano and in making the life of my neighbors miserable? I love a bird and am interested in all its organs, its beauty and life. Why not study the birds and let them make the music?

Much of life's energies are spent in trying to adjust square pegs to round holes and round pegs to square holes, and life may be spent before the adjustment is complete. Modern civilization tends to specialization. Men vary as widely as do the stars. There is a place for every one, and some one to fill the place if this great mass of unlike units can only be sorted and fitted into the complex problem of civilization. The first question, and the question which should be oft repeated, is: What am I good for—what branch or branches of agriculture will give the greatest pleasure and profit? Having answered this question, pursue the work through all discouragements to a successful issue It is possible you have no capacity for farm life, and since you cannot buy a capacity, better go directly to town and fit yourself into your environment. I have known men to toil many years on a farm and near the close of life be driven to town by the sheriff. There they made not only a living but secured a modest competence in conducting some little one horse business, the profits or losses of which could be counted up every night. The farm with all its complexities, and profits or losses a year or five years in the future, was too large and far-reaching for their narrow understanding. All are not so fortunate. Some remind us of the Quaker's dog which he sold to his friend and recommeded him as a good coon dog. The dog proved to be a failure and was returned to the seller who said, "I am much surprised. Thee believes that nothing was created in vain, does thee not Ephraim?" "Most certainly I believe that the Creator made all things for some beneficent purpose." "I, too, believe this, and I had tried that dog for everything else under the heavens but coons, so I was certain he must be a good coon dog." In the human family we have a few of these "coon dogs," but I have promised not to exhibit a museum of monstrosities, so let it pass.

A competency is always in sight in this country for those who do well those things which are suited to their tastes and training. A competence may be secured by following those branches of farming which require the minimum of labor and the maximum of skill and training My friend of Westfield, Mr. G. Schoenfeld, from Germay, has six acres of land, a part of which is covered with glass. He did that terrible thing, ran in debt for the full purchase price of the land. It and the valuable improvements upon it are paid for. This modest home is valued at $6,000. While paying for this home, a large family has been raised and educated, the eldest boy entering Annapolis Military School with a high standing. It is probable that this son one day will be acknowledged as the intellectual and social equal of the aristocracy of Germany, should he ever visit the fatherland of his parents. But why this long account of a not unfrequent occurrence, to show how it was done? This German, though untrained, succeeded from the first in producing superior carnations. He followed up his success and sold the product of brains instead of the fertility of his little farm.

Mr. Schoenfeld, among other things, raises flowers, carnations being his specialty. He sold in Buffalo, during one year (October 1, 1896, to September 30, 1897) 80,946 flowers for the net sum of $719.08.

Amount of plant food removed by 5,000 carnations: Nitrogen, 5¼ oz.; phosphoric acid, 2 1-5 oz.; potash, 10½ oz.

The 80,946 carnations sold for $719.08 and they removed from the soil 5 pounds 4 oz. of nitrogen, 2 pounds 3 oz. of phosphoric acid, and 10 pounds 8 oz. of potash, worth about $1 32.

Amount of plant food removed by 856 bushels of wheat, being the amount which at 84c. per bushel would bring $719.08: Nitrogen, 991 pounds; phosphoric acid, 446.8 pounds; potash, 282.4 pounds.

In round numbers, 20,000 flowers were sold at retail by the dozen, used in making flower displays for weddings, and the like, for which he received $450.80.

The indoor plants are set in benches 3½ feet by 80 feet, and each plant occupies a square of about 8 by 10 inches, or 500 plants in a bench. Each plant produces some twenty-five saleable flowers.

The *net* returns for flowers sold during the fiscal year ending September 30, 1897, amounted to $1,169.88. The expenses, including taxes, insurance and ten per cent. on the capital, were $790.67. This includes the cost of raising 12,000 plants, about 6,000 of which netted $263.24. In round numbers, then, the net income from the one leading industry (flowers), after paying ten per cent on the invested capital, coal and workmen's bills, was $642.45, with an additional prospective income from the 6,000 plants which remained unsold.

When I last visited this gentleman he informed me that he had all the land he wanted. Since that time he has purchased eight acres adjoining, has made some improvements upon this land and now values it at $2,000, but it is stated, incidentally, that the reason he made this purchase was that the land was in the market and he wanted control of it that he might choose his neighbor. The land, he says, is now in the market, although it paid nine per cent. clear of all expenses on a valuation of $2,000.

The question is often discussed as to how much land is necessary to insure a competence. Here we find that six acres suffices. A large family has been fed chiefly from the products of the orchards, vineyard and garden, and the children are receiving a practical and, in some cases, a liberal education. All this has been accomplished because this man understood the value of scientific agriculture, and was wise enough to follow up his successes.

Not only follow up successes, but learn to do the difficult things, for there will always be a throng seeking for the easy things, things which require the maximum of muscle and the minimum of brains. Why do such multitudes seek this hard, easy work? Because they will not consent to endure the toil, shall I say, of acquiring the power to think deeply, accurately and effectively. Some of our sympathy is thrown away upon these muscular workers. Their desires are few, their wants simple; their appetites good and their sleep sound and peaceful. Let us show them the way to a high life, open the door to those who choose to enter, and fret not because all will not enter in. "Some are, and must be, greater than the rest, more rich, more wise; but who infers from hence that such are happier, shocks all common sense."

The man who fells the trees in the wood may receive fifteen cents per hour, the man who controls the carriage of the great saw-mill and decides on the instant what shape and dimensions the lumber shall take may receive twenty-five cents per hour for simply moving a little lever. A third man causes a piece of wood to take on the form of beauty for the great stair-case and may receive fifty cents per hour. The fourth furnishes the design for this beautiful stair-case and may receive a dollar an hour. The man who does the so-called "hard" work receives the least pay. Why? Because it is the least difficult. This difference of remuneration holds good on the farm. Mushrooms sell for fifty cents per pound; maize for one-half to three-fourths of a cent per pound. Why? Because anybody, even a squaw, can raise maize, but only a skilled gardener can succeed in mushroom culture. Hot-house lambs bring from six to ten dollars when two months old; a poorly bred sheep at two years of age may bring from two to four dollars. Why? The breeding and feeding of the one is easy; of the other difficult.

Last year the raising of potatoes was difficult. The blights, the bugs and the beetles were present in full force. Good potatoes in the middle and eastern States rose to sixty-five cents per bushel wholesale. The man who watched and fought intelligently secured 300 bushels per acre and a ready market; the careless man and the man who should have been raising horses or chickens secured thirty bushels per acre and a slow market. Why? Because unusual difficulties were present, and the man who was able to cope with them drew the prize of $195 per acre. This successful potato raiser the previous year secured more than 300 bushels per acre and sold them for twenty-five cents per bushel, or more than seventy-five dollars per acre.

If from 200 to 300 per cent profit can be secured and the limit of profit not yet reached in one of the most common products of the farm, what possibilities loom up for securing a competence from those products which require greater skill and knowledge than the raising of potatoes ?

Take the crops which are supposed to give promise of securing little or no profit at the present low prices, as wheat and oats. Here is one man, on land naturally below the average, who has secured during the last fifteen years an average of nearly thirty-five bushels, and in a few cases forty bushels per acre. The average yield for the whole United States in 1889 was a shade less than fourteen bushels per acre. During the same year, the average yield of oats was 28.57 bushels per acre ; and hay, including such other crops as are used for forage, averaged 1 26 tons per acre. Good farmers secure sixty to sixty-five bushels of oats, and two to three tons of hay ; and in propitious years eighty bushels of oats and four tons of hay per acre. These latter yields always show large profits and lead to a competency, while the average yield usually gives no profit. If the average yield gives only a bare subsistence, what must be the condition of those who secure much less than the average ? If one man raises thirty-five bushels of wheat, five other men must each raise ten bushels to secure an average yield of fourteen bushels per acre. Some entire States, as for instance Mississippi, North Carolina and Tennessee, have an average of six, six and nine bushels, respectively, per acre. What is the remedy Stop raising wheat and raise something better adapted to soil and climate, or go to town and sell peanuts. Some of these men who utterly fail to comprehend the laws of wheat culture may be good enough " coon dogs " after all.

It will be said that if the yield per acre be doubled, the market will be so glutted that no one will receive profits This is the old scarecrow. No farmer can control the prices of his products. The law of supply and demand is inexorable. What he may do is to improve quality, diminish cost, find the best market and increase the production from a given area. If he raise the yield from twenty to thirty-five bushels while the yield of his neighbor remains at ten bushels and prices remain low, we shall soon see an illustration of "survival of the fittest." The thirty-five bushels will yield a fair remuneration for the work expended in production when prices are at the lowest. When they are high, the profits are 200 to 300 per cent. Wheat for the last ten years has averaged eighty-four cents per bushel in June in central New York. Allow three dollars for the straw of the lower yield, and if the wheat were sold at the average price, the total income per acre would be $11.40. For the straw of the larger yield, allow six dollars, which, added to the wheat at the average price, would give a gross income per acre of $35.40.

The cost of raising and marketing an acre of wheat, including a rental of five dollars for land and two dollars for fertilizers, may be set down at from fifteen to twenty dollars. If the most successful compels the less successful farmer to stop raising wheat at a loss what will he do with his land ? Better give it away than lose by farming it. Better abandon the farm and go to town and set up a second-hand clothing store. There is always at least a small profit in that business.

A large herd of dairy cows was tested in central New York and the owner of the herd was informed that about one-fourth of his cows were profitable, one-half paid their board bill, and one-fourth were kept at a considerable loss. He was advised to reduce his dairy, dispose of the unprofitable cows. His answer was : " But what will I do for cows ? "

Then to secure a competence, the crops and the land which uniformly produce loss must be abandoned. How it worries the city penny-a-liner, and how it rejoices the successful farmer to see land thrown out of cultivation—abandoned. To me nothing is so encouraging in agriculture as this late acquired knowledge which reveals the fact that vast areas have been cleared and brought under cultivation which should have been left undisturbed, except to harvest the mature trees and protect the young plants from the ravages of fire and cattle. As the blackberry bushes, year by year, creep down the steep hill-sides and over the rock covered fields, one rejoices at the pioneer work these modest, hardy, tap-rooted plants are accomplishing. How wisely and well they fit the soil for a higher and more noble class of plants, and how surely in time they cover the shame and nakedness of Mother earth !

The rural population has made many and serious mistakes, toiling to reclaim land which was not worth reclaiming not worthy of an intelligent farmer. But how could they know better? Not one college of forestry in all this great land up to 1898, and as yet but one. Until the last generation not a single school of agriculture, scarcely a book obtainable which gave direct help to the rural boy or girl. Therefore the farmer should not be blamed for the wasteful and unscientific treatment of forest and field. All this leads to the conclusion that to secure a competency, lands of high and varied agricultural capabilities, lands worthy of an intelligent American should be selected, upon which to build and maintain rural homes.

Quantity of farm products we have in abundance; better quality is now what is wanted, since quality may improve prices and widen markets. To assist in securing a competence, some specialization is advisable; sometimes this has been carried so far as to work serious disaster. Many farms in western New York have been almost exclusively devoted to the raising of grapes which, when poor or only moderately good, sold at ruinous prices. It is noticed that where only an eighth or fourth of the farm was devoted to vines, the yield was not only proportionately larger, but the quality better than where nearly all the land was used as a vineyard. Wherever diversified agriculture was carried on to a limited extent and plantations restricted, the low price of grapes made no serious inroads on the income. Where all of the land was given up to grapes, work was intermittent, the farmer being overtasked at one season of the year and idle at another. The demoralizing effect on the farmers and their families of this army of unrestrained youths and loungers of the city which, for a brief period, swarmed in the districts devoted to specialized crops, as grapes, berries and hops, is marked.

The baneful results of raising a single or few products in extended districts may be seen in California and the great wheat districts of the North-west. In such localities there is little or no true home life with its duties and restraints; men and boys are herded together like cattle, sleep where they may and subsist as best they can. The work is hard, and from sun to sun for two or three months, when it abruptly ceases, and the workmen are left to find employment as best they may, or adopt the life and habits of the professional tramp. It is difficult to name anything more demoralizing to men, and especially to boys, than intermittent labor; and the higher the wages paid and the shorter the period of service, the more demoralizing the effect. If there were no other reason for practicing a somewhat diversified agriculture, the welfare of the workman and his family should form a sufficient one. Happily, many large and demoralizing wheat ranches are being divided into small farms, upon which are being reared the roof-tree, children and flowers.

To secure a competence, no more activities should be entered into than can be prosecuted at a profit. On the other hand, too few activities tend to stagnation and degeneration. Mental power, like many other things, increases with use and diminishes with disuse. The farmer who simply raises and sells maize is usually poor in pocket and deficient in understanding. The college graduate who attempts but a few easy things seldom becomes a ripe scholar.

To secure a competence, the petty outgoes should be met by weekly receipts from petty products. I have known so many farmers to succeed by specializing moderately along one or two lines, while holding onto, in part at least, diversified agriculture, that I am tempted to give a single illustration as a sample of thousands which have come under my notice.

A Scotchman and his family of four little children landed in northern Indiana with three to four hundred dollars; to this was added as much more by day labor. A farm of about 150 acres was purchased, 100 acres of which were adapted to wheat, corn and clover. Thirty acres was marshy pasture land ; the balance, timber. Wheat was selected as the great income crop, which was supplemented by the sale of one to three horses yearly. The butter from twelve cows, the chickens, ducks, and their eggs were taken to the city once each week. The result was that at the end of the year there were no debts for subsistence to be paid ; this left all the money received for the wheat and horses to be applied towards liquidating the mortgage. In a few years a large, comfortable new house was built. This was followed by the purchase of another farm, and still another until each child was provided with a home and facilities for securing a modest income. This shrewd Scotchman succeeded because he neglected neither little nor great things.

With what pride the writer, in 1863, deposited $1,700 in bank, the product of a single wool crop, and the little farm of one hundred and twenty acres was not all devoted to wool raising. If a young man can secure a loving, helpful wife, four good cows and enough land to produce food for them, with room left for an ample garden, a berry patch and a small orchard, he may consider himself rich ; and if he be able and intelligent, he will soon have a competence.

The farmer, of necessity, goes to the city or village once each week for supplies which cannot well be produced on the farm. He should return, if possible, with more money than he had when he left home. The big mortgage which was given for part of the purchase price of the farm is not what will make him unhappy, but the steadily increasing little charges accumulating on the tradesmen's ledgers until this "honest" farmer dreads to meet a score of his own acquaintances.

The farmer who, from his *well-painted covered* democrat wagon, sells the product of his skill and labor, looks to me quite as dignified as does the merchant who sells nails and codfish, turpentine and bobbins, patent medicine and jews-harps, none of which represent his own skill or labor.

Farming will never be carried on in America by trusts or syndicates. A combine can run fifty nail factories or breweries, but not fifty farms at a profit, because farming is too difficult, requires too close supervision and frequent change of details and combinations, and new plans to meet the ever changing conditions of climate and soil. The conditions which surround agriculture put a quietus forever on "bonanza farming" and tends to the rearing of ideal homes and the accumulation of modest income. Mining farming on virgin, fertile, unobstructed arrears can be successfully prosecuted for a time.

"The Red River Valley native soils contain from .35 to .40 of a per cent of nitrogen, while the soils which have been under cultivation (*in wheat*) for twelve to fifteen years contain from .2 to .3 of a per cent."*

Another important point : when humus is taken out of the native soils, as in the case above, during the process of analysis from .06 to .08 of a per cent. of phosphoric acid is soluble and associated with it, while only about ·02 of a per cent. is in this form with the long cultivated soil. Allowing that an acre of soil, one foot deep, weighs 1,800 tons, the native soil would contain from 12,600 to 14 400 pounds of nitrogen per acre, while the cultivated soil would contain from 7,200 to 10,800 pounds per acre. If the average amount of nitrogen in native soils (13,500 pounds per acre), and the average in the soil after it had been cropped twelve to fifteen years (9 000 pounds per acre), are compared, it will be seen that the soil has lost 4,500 pounds of nitrogen, or more than one-third (probably one-half) of the nitrogen which could well be made available.

Fifteen crops of wheat of twenty-five bushels per acre require 225 pound of nitrogen, or one eighth of the amount which the soil lost during the years of cropping. This soil under "bonanaza farming" has lost outright nitrogen sufficient for one hundred and twenty crops each requiring as much nitrogen as a crop of twenty-five bushels of wheat per acre does. When the amount wasted on a single acre is multiplied by the acres of the vast fertile wheat plains of the West, where "bonanaza farming" is carried on, the loss of nitrogen to our country is seen to be so great as to appal the thoughtful man who looks forward to the generations who will want this element in the not distant future. Happily, this "bonanaza farming" has its own cure. Mining farming soon reduces the yield so low that profits vanish, and then these great farms will be cut up into modest sized ones and true homes will arise and intermittent labor and the tramp harvest hand will disappear, and the last and only condition which tends to produce an uninstructed peasant class disappears.

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*Prof. Henry Snyder in Bulls. 30 and 41, Minn. Agr. Expt. Sta. See "Fertility of the Land"

The other great "bonanaza" industry which still remains and which affects agriculture and the land directly, is lumbering. This, like "bonanza" wheat farming, may be classed as a mining industry carried on at the surface instead of in the bowels of the earth. Without national direction, restraint or control, this agricultural mining goes on until the sources from which the profits are drawn are so deplete as to be no longer profitable. There is no home or competency for the farm boys in the lumber camp or on the great wheat farm. Here, the rule is to take all and return nothing. After the axe and the header, comes the fire to complete the wanton destruction. The shade-giving and moisture-conserving brush and stubble and straw, and all living plants, are destroyed and nothing but the mineral matter which they contained is left. A blackened waste, devoid of animal or vegetable life is left behind. No homes can be reared here, no competence secured until nature, assisted by man in the coming years, slowly restores the covering and fertility of the soil. This unwise treatment of the land must soon come to an end. Then the hardy home builder will have opportunity to repair, by more rational methods, some of the wanton and unnecessary waste.

Is it too much to hope that before the close of another decade every state and territory will have a school of forestry, and that all national forest domains will have been brought under rational supervision and control? The future home builders will need them, and the present owners of homes have a right to a share of the benefits which flow from intelligently managed forest preserves. It is not enough to show that intelligent farming is highly remunerative at the present time, provision must be made by which the children and the children's children for all generations may have opportunity for securing a competence from rural pursuits.

Can a competence and a comfortable home be secured by the renter? If not, why not? Shall the farmer put his little capital in a home and run in debt for supplies and necessary equipment? Or, would he better rent and start even? This depends, to a large extent, upon the individual. A successful country life does not depend upon owning the land in fee simple. This hue and cry about renting has no terrors for those who have been renters and have found that this is often the most satifactory way to start when capital is limited. The merchant of limited means invariably rents the building in which he does business because it is safer and usually more economical to rent than to purchase the business block.

In an old city of twelve thousand inhabitants, it was found that eighty-four per cent. of the business was carried on in rented rooms. The trouble in renting farms in America lies chiefly in the fact that there is no well digested laws or old customs which help to guide the renter and the rentee. A few simple laws would provide for adjusting the value of betterments left on or put upon the farm at any time. Long leases, with inducements to long occupancy, would give the renter a permanent occupier. The rentee has quite as good a chance of finally securing a home in fee simple as has the man who purchases and mortgages heavily. The possession of a valuable farm and an assured income, especially in a new country, is often most surely and easily secured by renting for a series of years. Good farming pays liberal profits even on rented land. If there is failure, it is the man not the system or the occupation. The fault will not be in the moon, but in ourselves if we fail or are underlings.

[This article will appear as the second chapter of a new book entitled, "Rural Homes," now being written by Prof. Roberts, as a companion to his former book entitled, "The Fertility of the Land."—Editor.]

ENLARGING THE FARM.

Probably at some time in his experience every farmer has given more or less attention to this question, and generally from the standpoint of the Yankee who, when asked why he wanted more land, replied, "To raise more corn, on which to feed more hogs, to sell for more money, to buy more land." But is the Yankee's plan the best one? The farmer who, having one hundred acres, buys another hundred, thereby enlarging his farm to twice its former extent, has at the same time made it necessary to expend very nearly twice as much in working expenses, without counting the extra capital invested in the addition, which makes it necessary that he should get back more than double his previous returns to justify the outlay. Consequently, to profitably enlarge our farms we must seek some other means than alone increasing their superficial area.

It is conceded that our farm capital is not now yielding a return of three per cent. In a majority of cases it will be found, if the farmer allows himself and family the wages of an ordinary farm laborer, that there is nothing left for interest on capital. We deplore the inclination of our boys and girls to leave the farm for other callings and professions, but we ought not to expect anything else. Take the case of the so-called professional man with brains sufficient to make a good farmer. Five years of time and $1,500 of capital expended in qualifying himself, and he will think himself poorly paid if he cannot earn at least $1,000 per year. On the other hand the young farmer must take, in the ordinary way, at least ten years to learn his profession, and to practise it requires a farm costing at a low estimate $3,000, and a working outfit costing $1,000 more. Then, if by industry and economy he can at the close of the year show a net return of $200* he is considered a successful man, whereas to be at all on a par with his brother professional he should have at least $600.* I am not an advocate of keeping all the boys upon the farm. The other callings would fare poorly if they could not get some of our healthful blood, but I would like to see our farms so enlarged in their returns as to make it an object for a very much larger proportion of the brainy ones to remain there.

The first step towards enlarging a farm is to examine closely what it is made of, not only at the surface but away down three feet below, as we must enlarge up and down. Next, what will our land produce most freely, at the least proportionate cost, carefully considering the most convenient markets at which our products can be profitably disposed of? Poor Richard says:

> "Plow deep while sluggards sleep
> And you shall have corn to sell and to keep."

Now it is plain that poor Richard either wasn't a farmer, or else he had a very deep alluvial clay loam soil to deal with, as, if he had a light loam or sandy soil of any considerable depth and followed his own prescription, he would have had little or no corn either to sell or to keep. Probably this laying down of axioms is what is known as "Book Farming," without regard to circumstances, has done more to destroy confidence in it than any other thing. There are only two axioms that I know that can be applied to all farms successfully without regard to circumstances. They are, "Well directed Industry" and "Rigid Economy." Many fairly good farms have been almost or entirely ruined by one deep plowing, turning down the plant food that had accumulated at the surface to such a depth that it became useless, being washed down still further into the porous subsoil, out of reach of the plants it would have sustained if retained at the surface. By careful cultivation very poor sandy soils can be made fairly productive. I well remember a farm of this character, on which several farmers had starved out, coming into the hands of a practical man, who in a very short time changed it to a productive property. Recognizing that there was nothing below upon which he could rely to increase his returns, he turned his attention to what lay upon the surface and the atmosphere above it. Merely scarifying the surface, he sowed principally peas, clovers, roots and other broad-leaved plants that drew largely from the air, feeding all the stock possible, especially sheep, applying his manure upon the surface and growing an occasional crop of wheat, with the result that in a few years the farm was enlarged to more than three times its former capacity without adding an acre, and its owner was enabled to retire with a nice competency, when, had he followed Richard's advice literally, he would have starved out.

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* This clause is misleading. The farmer who dresses his family and lives as most farmers do, keeps a driver and suitable rig or rigs, and banks $200 per year, is better off and better paid than the man who lives in the city and receives $1,000 per year as a salary. Again, $1,000 is too small a sum to use as working capital on a farm of 100 acres, if the best results are to be obtained. True, many men have started, and many are now farming with less capital, but if they have the necessary knowledge and ability they could do much better for themselves and their families if they had more working capital than the sum named. Editor.

Fortunately the great majority of our farms are not of the character just described but of a firmer texture, requiring much more labor to bring out their best qualities. Too often the subsoil presents a barrier to the passage of air or water through it, and furnishes an opportunity of doubling the capacity of the farm by enlarging it another foot downwards. Probably this was the soil Richard had in view when he advised to "plowing deep," but plowing deep in such soil is laborious work, hard on men, teams and implements, all of which costs money, and if alone relied upon to open up this impervious soil, must be repeated each year. Results prove that even with this added labor and expense the returns are only occasionally and under favorable conditions increased. The reason for this is not far to seek. This plowing is too often performed when it only packs the hard clay more closely, completely taking up the plant food contained in the clods formed by the plow. To continue this system can only end in utter failure and disgust with farming. Yet those are lands that when once properly worked will gladden their owner with enormous yields, but to get those yields the soil must be pulverized, not only at the surface, but to a depth that will give the plants plenty of air and relieve them of surplus water. Healthy plants can no more be produced with constantly wet feet than can healthy people. Then the first effort must be directed to getting rid of surplus water. Upon no clay or clay loam soil should water be allowed to stand one hour, if it is intended for crop purposes. Such land once freed from surplus water can be more easily cultivated. With the pulverization of land we usually couple a liberal use of surface and subsoil plow, harrow, cultivator, roller, etc., and no doubt for deepening the soil quickly some or all these advantages, but a less expensive and more efficacious way of pulverizing the surface soil and that to a considerable depth is by mulching. If possible, the surface should be constantly covered so as to prevent it from hardening. Any person who is skeptical as to the benefits to be derived from mulching has only to lay a board down upon a hard clay surface and allow it to remain there undisturbed for a considerable time to prove its ameliorating effects. But, says one, we cannot cover our farms with boards. No, but we can do better, we can cover them with buckwheat—despised crop. There is nothing better for loosening up a long neglected soil. Peas, clover and other crops require constant surface cultivation—all of which serve a double purpose in their ability to extract a large amount of nutriment from the atmosphere at the same time that they are pulverizing the soil and fitting it to produce much more of other crops. Perhaps just now some good industrious farmer, with a family of boys and girls, just the material that Ontario wants for citizens, is thinking of buying more land, involving himself in debt possibly to give them a start, or may be shipping them off to Manitoba with little or no capital. Think twice before you do either. Debt is a bad thing. Manitoba and debt together are worse. Hold a family council, discuss the capabilities of the old farm. Depend upon it you can enlarge it to double its present capacity with less than one-half the outlay required to purchase another farm or to furnish an outfit to run a Manitoba one. Introduce better blood into all your stock, even to the hens. If that family council is rightly conducted, the good wife will show you how for every pound of butter she is making she can make two, each of which will be worth more money. The boys will show you how the poor scrawny calf that you now sell for a dollar or two can be made worth $10 or twice that at the same age; how pigs can be turned off at four to five months weighing 160 lbs. to 180 lbs. each. The girls will show you how the household expenses, including carpets for the floors, pictures for the walls, curtains for the windows, an organ or piano for the parlor, etc., can be procured with the produce of the hens and small fruits that they will care for, providing they be allowed to apply the results obtained in thus beautifying their homes. That old orchard can be pruned, the trees scraped and washed with lye, the sod broken up on the surface and treated with those ashes that the itinerant ash buyer is getting for a three cent bar of soap per bushel, when they are worth 25 cents per bushel in that orchard. Try it. Instead of doubling its capacity it will be increased five fold, both in quantity and quality. Try it, brother farmers, in every department of your calling and soon your farms will be enlarged to more than double their present capacity, and you will be entitled to the proud position of Him who has made not alone two blades but many to grow where but one has grown before.

This excellent article was sent in without the writer's name or address. The writer contrasts five years of preparation for the professional man with ten years of preparation for the farmer. This is not stating the case in a complete or unassailable form. For instance, let us take two boys of the same age, both entering school at seven years and the high school at fourteen years. The boy who goes into a profession will take four years more to pass through the high school, four years for the university and three for his professional college course, or perhaps a couple of years less may be taken if he does not take the university course. Many take longer owing to failure at some of the many examinations meeting them along their devious course. When he then starts to practise his profession at about twenty-four years of age it is very doubtful, as thousands of young men in cities and towns well know, whether he can earn $1,000 during his first year. Many would be pleased to receive one-half of that amount. The young farmer will be able to put himself through the high school and the agricultural college in at least the same number of years, and he will do it at an expenditure of one-third to one-half of the amount required by the professional man.

HOW TO RESTORE AND MAINTAIN SOIL FERTILITY.

By Wm Rennie, Farm Superintendent, Ontario Agricultural College, Guelph, Ont.

The virgin soil, filled as it was with thoroughly prepared plant food, produced for years a variety of good crops regardless of any system of cultivation or rotation. But that natural supply has been largely drawn upon, and now we must look for means whereby we may restore and maintain the fertility of the land. The scientist has come to our aid. Knowledge gained through scientific research and practical experiments now enable us to cultivate the soil more intelligently than formerly, and to obtain the very best results at the least possible cost. Scientific men, who have made a study of the natural laws governing soil cultivation, call our attention to Nature's method of cultivating the new soil, surface preparation, or the rendering available of the crude plant food (humus) by the myriads of bacteria working in it. Now we must assist Nature's agents; cold wet lands must be underdrained to add warmth and allow these tiny germs to grow, and render the plant food useful to the growing crops. In some cases farms have been worn out. But these farms may be renewed; all that is required is that they have a liberal supply of vegetable matter incorporated with the soil. The need is well supplied by clover and other leguminous plants, and by good barnyard manure. In this country, where clover and peas grow so well, we do not require to use artificial fertilizers to maintain the soil fertility, but a systematic rotation is essential. On the Experimental Farm we follow a four years' course of rotation. The first and second years, hay and pasture; third year, peas and hoed crop, corn, roots, potatoes and rape; fourth year, fall wheat and spring grain, seeded down. Instead of having fields the farm is divided into four sections. The portion required for pasture is fenced off by means of a portable fence which is removed in the fall. No fence is necessary in the third year, as the section is in hoed crop; neither in the fourth year, as it is then in grain. In summer and early fall the second year sod-land is plowed shallow (three or four inches deep) and immediately harrowed to conserve moisture and hasten decomposition, the essentials for which are heat, air and moisture. Shallow and thorough cultivation during the early fall will clear the soil of perennial weeds—weed seeds will germinate and be destroyed. By this method of tillage humus is formed, and through the action of bacteria during warm weather it is rendered available for plant food.

To prevent the prepared food from leaching away and evaporating during fall and winter, it is advisable to rib the land. For this purpose a double mould-board plow is used and the land thrown into ribs about twenty-two inches wide. Before doing this, however, all available barnyard manure should be spread on the surface and ribbed in with the vegetable matter. In this way a superior quality of plant food is formed, of great benefit to all farm crops and more especially beneficial to corn and roots, as these crops are heavy feeders. After the corn is harvested the ground is cultivated between the rows, then ribbed, leaving a row of corn roots in each alternate rib. This is preferable to plowing. The root land is ribbed across the drills without cultivating. The tops are thus mixed with the humus, making a large amount of excellent plant food so necessary for the succeeding grain crop, viz., spring wheat, barley and oats.

Before sowing in spring the drills are levelled by harrowing and cultivated with a spring tooth cultivator. The grain is drilled in, sowing not more than one and a half bushels per acre of either barley, spring wheat or oats. The grass seed is sown at the same time in front of the spouts. The following mixture is used: Seven pounds red clover, three pounds alsike and four pounds timothy seed. The ground is then harrowed across with a light harrow, or, what is better still, a "Breed Weeder."

HOW TO KEEP UP THE FERTILITY OF THE SOIL.

By John Clarkson, Chatham, Ont.

While I am desirous of discussing this important question without reference to the scientific aspect, as I prefer leaving that phase of the question to be considered by our college professors and graduates, and only dealing with it in a practical way, it may be necessary at the outset to say that there are ten elements of plant food that must be present in the soil in order to successfully mature plant life, but that only three of these are likely to be exhausted, viz., nitrogen, phosphoric acid and potash. By keeping up the supply of these three elements in sufficient quantity and in suitable proportions, we solve the problem of keeping up the fertility of the soil. These elements are purchaseable in the form of commercial fertilizers, but if we except market gardeners and florists, the price of these articles prevents their general use by cultivators of the soil.

Nitrogen is found in abundance in the atmosphere which surrounds us on every hand; phosphoric acid is found in the bones of animals and in the subsoil of our farms; potash in wood ashes, decayed vegetable matter, and also in the subsoil. All three are found in about the proper proportion for application to ordinary soils in barnyard manure. The manufacture, care and application of manure, therefore, becomes an important factor in keeping up soil fertility. In the manufacture of manure it is necessary to discard the old-time wasteful method of throwing straw down from the straw stack and treading it under the feet of beasts. Any person who has once tried passing all the straw and fodder through the stables could not be induced to go back to the old way. Few persons realize the amount of feed value there is in a stack of straw. It may be made to take the place of hay to a large extent and the increase in the quantity as well as in the quality of the manure made will be more striking. The coarse grains grown upon the farm must be fed to animals. If only well bred animals are kept a greater return will be realized than by selling on the market the products we raise. Wheel the manure from the cattle stable, horse stables and swine pens into the same yard and mix them together so as to have the whole manure pile of one uniform quality and thus secure more even results when applied to the soil. A few brood sows kept in the yard will give valuable assistance in this work and will keep the manure in such a condition that it can be hauled at any time An old horticulturist said at one time that a good time to prune a tree was when you had a sharp knife. It may be said that a good time to draw out manure is when you have time and a clear field; but while this may be a good time, there is a better one. In my opinion the winter season is the proper time to draw manure as there is more leisure then, and besides, the teams require exercise. Spread the manure evenly on the surface of the soil, and, if the land has been previously plowed, work it in at seed time by the use of a disc harrow or some similar implement. If not plowed, the manure acting as a mulch will keep the soil moist and in good condition for plowing at any time. Manure thus applied not only does not waste to any great extent, but by keeping the soil loose and friable makes the preparation of a good seed bed an easy task, and by letting loose a larger percentage of the plant food contained in the soil and making it available for immediate use, a much larger yield is secured.

But as most farmers desire to follow a mixed system of farming, and will sell some of the produce on the market, the manure made will not supply all the deficiency of plant food, and we must draw upon nature's storehouses. To do this successfully we must adopt some system of rotation of crops in which the legumes play an important part. These leguminous plants are called nitrogen gatherers, because they possess the power of extracting nitrogen from the atmosphere and storing it up in the soil Of these the most important is clover, which is undoubtedly the farmer's best friend. This plant, in addition to its capacity to extract nitrogen from the atmosphere, also, by the aid of its long tap roots penetrating deeply into the subsoil, draws upon the store of phosphoric acid and potash contained there and retains them in its roots, ready to be used by the succeeding crop.

The particular rotation to be followed each farmer must determine for himself according to his requirements. I use a four field system because I have only four fields. My rotation is corn, oats and barley, wheat, and clover. I manure the clover sod for corn. If you have five fields, then beans or peas should follow the oats and barley. These crops make a good preparation for wheat, but better still if you can have six fields; then sow clover with the oats and barley and cut one year for hay; then manure for beans as a preparation for wheat. This is an excellent rotation for this portion of the Province, where corn and peas are staple crops, as it embraces almost all the crops usually raised by ordinary farmers, and gives two hoe crops for cleaning the land from weeds, two coats of manure, and two crops of clover to supply the necessary plant food With a system of rotation like this one, and by feeding the coarse grains, hay and fodder, on the farm, there will be no difficulty in keeping up the fertility of our farms.

But there is one more factor that is attracting considerable attention at the present time and is destined to play an important part in this work of keeping up the fertility of the soil—underdrainage. The system of draining the soil of surplus water by means of surface drains has been of great value to us in this western peninsula, but it has had its day and tile drainage is rapidly taking its place. The difference between the two methods may briefly be said to be, that while one takes the water off by running it over the surface, the other conducts it through the soil. By means of tile drainage the elements of plant food which descend with the rainfall—and the quantity is greater than we usually think—are extracted from the water while in passage through the soil and are retained there for use by growing crops. The atmosphere entering the drains and finding its outlet through the soil contributes its quota of nitrogen to the general store and thus helps along the work of keeping up the fertility of the soil. But in addition to these direct benefits derived from underdraining there is an indirect benefit that perhaps does more than either of the above mentioned results towards keeping up the store of plant food. By the free circulation of the water and the atmosphere through the soil it is made much more friable and the percentage of plant food available for present use is largely increased, thus securing a much more vigorous growth and consequently a greater yield, giving a larger supply of manure to be put back upon the land. There is thus a much larger amount of plant food being pressed into the service of the tiller of the soil and the products of his labor are materially increased.

The subject may be summed up as follows: Feed all the coarse grains, hay, straw and fodder, we can raise; exercise judicious care over the manure heap; apply it to the soil in such manner and at such times as will secure the best and most speedy results; follow a system of rotation of crops suitable to the requirements of your business, but one in which the legumes shall have a prominent place and shall provide for sufficient cultivation to keep the soil free from weeds; and secure thorough drainage by means of properly laid tile drains. Under such treatment there will be no fear of the soil becoming deteriorated. On the contrary it will continually increase in fertility and give greater remuneration for the labor bestowed.

OUR METHOD OF RAISING CABBAGE FOR GREEN FEED.

By T. D. McCallum, Manager Isaleigh Grange Farm, Danville, Que.

Preparation of Soil. Select a piece of stubble, plow from six to eight inches deep, harrow well and have land perfectly smooth. Drill with double mould-board plow, the same as used for turnips, twenty-seven inches apart. First, open and fertilize in drills with well-rotted manure, about thirty double loads per acre. Then split drills and sow about 200 pounds of phosphate to the acre on top of drills. Use turnip sower for sowing seed, with rollers attached, sowing and covering two drills at a time with about two pounds of seed to the acre.

Thin the cabbage the same as turnips, only about eighteen to twenty inches apart, leaving the strongest plants. By carefully hoeing off all weeds from the top of the rows, at the time of thinning, it will save any further work except running the cultivator once or twice through them afterwards. Sow the seed as early as possible in the spring. A good crop of cabbage put in in this way should insure a crop of about sixty tons to the acre.

Method of Feeding. We commence feeding cabbage about September first, and cut each day as we require. We feed them very extensively to our milk cows, and when fed in proper quantities we find the milk flow is greatly increased. For large quantity of food to the acre and small cost in raising them, cabbage cannot be excelled as a green fodder. We think if proper methods could be obtained for cutting them, cabbage would be the best crop to raise for the silo, as the quantity of cabbage grown on an acre will double that of corn. If the cabbages are not fed out when the hard frosts come, they could be packed with straw in a barn where it is not too cold to keep well into the winter. We would advise every farmer to grow at least one acre of cabbage. It form a first-class food for pigs, sheep and cattle.

MAKING PLANT FOOD AVAILABLE.

By G. E. Day, Agriculturist O. A. C., Guelph.

Plants require a considerable number of substances in order to make a successful growth, but they draw most heavily upon the nitrogen, phosphoric acid, and potash of the soil, and hence these substance are in the greatest danger of becoming exhausted. Practically, therefore, the farmer may confine his attention to keeping up the supply of the three substances just mentioned, for, in doing so, he will usually supply the other necessary substances, either directly or indirectly.

But it is not enough that the elements of plant food be present in the soil. A soil may contain abundance of plant food and yet not be productive. Before a soil can be productive a portion of the plant food which it contains must be available, that is to say it must be in such forms as will dissolve in the water of the soil or in the juices of the plant roots, because no plant can make use of food which is not first dissolved. Nor is this all ; the plant roots must have air for they must breathe, and they must also have warmth. We may therefore summarize the requisites of a productive soil as follows :—

1. Plant food that is soluble in water or in the juices of plant roots.
2. Sufficient water to act as a carrier of plant food from the soil into the plant.
3. Air.
4. Warmth.

If any one of these requisites is absent, the soil cannot be productive, and the commonest cause of crop failure is not the absence of plant food, but rather the absence of some of the conditions which make plant food available.

The plant food of the soil may be regarded as a part of the farmer's capital. Now, the profits from any business are not necessarily proportionate to the amount of the capital invested, but are more dependent upon the skill with which the capital is used. Thus the farmer must study how to use the capital which nature has placed at his disposal, and while it is important that he should not allow his capital to become impaired, it is equally important that he should use to the best advantage what is already at his hand. Comparatively few people fully realize how great are the natural stores of plant food in the average soil, and many a soil which is regarded as exhausted, still retains large stores of plant food which have become unavailable through unskilful treatment. Analyses of soils which have been cropped for a long period and are regarded as comparatively " worn out," go to show that in many cases these soils still carry sufficient plant food to produce several hundred crops of wheat equal to the average wheat yield of the United States if only this plant food could be made available. Further, at Rothamsted Experiment Station, in England, wheat has been grown for more than fifty years in succession on the same soil without any manure whatever, on land that was only ordinary arable land and certainly not rich to begin with, while the average yield for the period was 13½ bushels per acre, a yield that is higher than the average yield of the United States, including their rich prairie soils. Would it not seem, therefore, that the rendering available of the natural supplies of plant food is a question worthy of more careful study than it commonly receives ?

There is not room in a single paper to enter into this subject fully, but an attempt will be made to touch as briefly as possible upon a few leading points in connection with it.

1. *Influence of humus.* Humus, which is composed of decaying vegetable matter, is all important to the farmer, and he cannot value it too highly. It is humus that gives to new soils their dark color, and it is mainly to humus that new soils owe their superior fertility. Its influences for good are many and varied, as the following summary will indicate :—

(a) Humus contains nitrogen, and as it decays, its nitrogen is made available for plants, hence it is a direct fertilizer.

(b) During its decay, gases and other compounds are formed which act upon the mineral matters (phosphoric acid and potash) of the soil, tending to make them more available for plants. It is, therefore, an indirect fertilizer also.

(c) It does not bake and become hard in hot dry weather, hence its presence in clay soils makes them more easily worked, more porous, and consequently more favorable to the development of plant roots. The air, being more freely admitted, acts upon the plant food making it more available.

(d) It has the greatest water holding power of any constituent of the soil, hence an abundant supply of humus is the best safeguard against drouth.

But how is the supply of humus to be maintained in the soil? Though outside the province of this paper, a few brief suggestions may be permitted.

In the first place, farmyard manure is vegetable matter, and when mixed with the soil constitutes humus; therefore the manure pile should be increased and guarded with miserly care.

Secondly, the clover plant grows strong fleshy roots which not only gather food from the soil but also collect stores of valuable nitrogen from the air. Therefore, when these roots decay, they increase the amount of humus in the soil, and also the amount of available plant food. No farmer can afford to do without clover. Any green crop plowed under will increase the amount of humus in the soil, and is therefore beneficial, but only leguminous crops, such as peas, vetches, clover, etc , possesses the power of collecting nitrogen from the air, and of leguminous crops, clover is the most valuable for this purpose. However, clover will not grow on land nearly destitute of humus. In such a case, the humus could be increased by plowing under a crop of rye, thus furnishing enough humus to enable the soil to grow clover successfully. If manure is scarce, two or three pounds of clover seed per acre may be sown with each grain crop, and the clover plowed under (very shallow) in the fall. The result will be surprising to those who have not previously tried it.

Thirdly, frequent deep plowing tends to deplete the soil of humus, and turns the valuable portion of the soil down out of reach of plant roots, for it is the surface soil that contains the most invailable plant food. The aim should be to kept the humus near the surface, and loosen the low soil by means of clover roots, or, if need be, the subsoil plow The lighter the soil, the greater the danger of injury by deep plowing. Some of the once barren sands of New Jersey have been converted into productive farms by green manuring, and by plowing that is seldom more than four inches in depth. Of course there are exceptions in all rules, but the advocates of deep plowing have need to do some hard thinking along this line.

2. *Influence of soil moisture.* No matter how much plant food may be in the soil, and no matter in what condition it may be, it is no use to the plant unless moisture is present. As before intimated, water is the medium through which plant food is transferred from the soil into the plant, hence plant food cannot be available without water. Lack of moisture is perhaps the commonist cause of crop failure. A great deal has already been written on the conservation of soil moisture, and perhaps everyone is more or less impressed with the importance of having the soil in a fairly open condition so that it will absorb as much as possible of the water that falls upon it. Possibly every one knows that allowing land to lie with its surface unbroken until late in the spring, as is frequently done with turnip land, causes a very rapid loss of moisture and an accompanying baking of the soil ; probably everyone understands that root crops sown on the flat are much better supplied with moisture than those set up on the top of high ridges ; and probably no one is ignorant of the fact that stirring the surface soil at intervals of a week or ten days among those crops that will admit of it, such as roots and corn, prevents the moisture of the lower soil from coming in contact with the sun and wind, and thus effects a great saving of moisture for the use of the crop. But it is too frequently overlooked that a clay soil without humus would absorb very little water during the rainy season, since it is so compact that the water would run off its surface, and consequently the dry season would find it very poorly supplied, and baked so hard that plant roots could not penetrate it nor extract a single drop of water from it. On the other hand, a sandy soil without humus would allow the water to run through it like a sieve, and retain next to nothing for the use of plants. Therefore, it is humus that is all important in conserving moisture. Once get the soil well supplied with humus and any ordinary drouth need not be feared.

3. *Influence of underdrains.* If a sponge is dipped into water and then removed, a portion of the water will still remain in the sponge, while another portion will drain out of it. The water which remains in the sponge is held by the attraction of the sponge for the particles of water, and will remain in the sponge until removed by evaporation. It may be called *capillary water*, for the force which holds it in the sponge is known as

capillary attraction. The water which drains out of the sponge may be called *free water*, since the sponge has not power to retain it. Thus in the soil we have *capillary* water and *free* water. Capillary water is very essential, and the greater capillary power the soil has, the better. It is this water that supplies the needs of plants, and, as already pointed out, humus owes much of its value to its power of holding water in this way. Free water, on the contrary, is very injurious. It clogs up the pores of the soil, excluding air and making the soil cold, so that the roots of plants cannot penetrate into it. Therefore, plants on an underdrained soil form very shallow roots, and their feeding ground are very much interfered with. As the season advances, the free water gradually drains out of the soil or evaporates, but the particles of soil in the meantime have run together, forming a baked, hard mass practically impenetrable by the plant roots. This running together and baking of the soil very seriously injures its capillary power, so that the soil that has been saturated by free water for a considerable length of time will contain very little capillary water after the free water has disappeared. Thus the plants which had too much water early in the season will be left with too little water at a later date, and with a very poor root development to boot. Had this free water been removed at once, by underdraining, the soil would not have been baked and its capillary power would have been much improved—the plants would have sent down their roots more deeply and thus obtained a larger feeding ground, and, consequently, a larger supply of plant food and water. More than this, air and warmth would have penetrated the soil, and these two factors have a wonderful influence in changing plant food into forms that are available to plants. Thus underdrains not only help to change plant food into favorable forms, but they also increase the supply of moisture, the value of which has already been explained.

4. *Influenee of rotations.* Cereal crops, such as barley, wheat, oats, corn, etc., draw rather heavily upon the nitrogen of the soil, and after the crop is removed, there is a comparatively small residue of roots and stubble to take the place of the humus which has been decomposed in the soil during the growth of the crop. Consequently, cereal crops tend to exhaust the humus of the soil. Root crops also tend to exhaust humus, but the cultivation which they receive (or ought to receive) during the summer, has a great influence in making plant food available, so that the succeeding crop is benefitted by the cultivation received by the root crop. This available plant food is mainly near the surface, and should be kept there, not plowed down deeply before the next crop is sown. But leguminous crops, peas, clover. etc., gather nitrogen from the air, as was previously stated, and clover will leave the soil richer in humus than it was before the crop was sown. Moreover, the roots of clover penetrate into the subsoil and there collect considerable plant food that was unavailable to other crops. Some of this plant food remains in the roots of the clover, and when they decay, it is in excellent condition to be made use of by other crops. Still further, the roots of the clover open up the lower soil more effectively than a plow could do it, and they admit air and warmth with their benficial influences. There are other and more complicated principles underlying rotations, but perhaps enough has been said to illustrate the necessity of variety of crops, and to emphasize the importance of clover as a soil improver. It will also be seen that the shorter the rotation the better, as the short rotation admits of the more frequent growth of soil improving crops. To illustrate the advantage of growing crops in rotation, the following extended experiment conducted at the Rothamsted Experiment Station, is appended :

Wheat and barley were grown in a four course rotation with roots and clover or beans, the rotation being roots, barley, clover or beans, and wheat. The experiment covered eight full courses, or a period of thirty-two years. The experiment was conducted with three sets of plots, one setting receiving no manure, one superphosphate only, and the third, mixed mineral and nitrogenous manure. On another series of plots, treated in the same manner as regards manure, the same crops were grown continuously during the same period of time. Thus a comparison of the effects of growing crops continuously and in rotation can be made by taking the average yield of each crop for the eight years in which it occurred during the rotation, and setting it against the average yield on the continuously cropped plots for the same eight years. The results are given as total dry matter per acre, including dry matter in grain and straw, and are as follows:

Average amount of dry matter produced annually per acre on all plots.

	Under rotation.	Under continuous cropping.
Barley	3,493 lbs,	2,930 lbs.
Wheat	4,361 lbs.	2,360 lbs.

The results require no comment. They illustrate, in a very forcible manner, the influence of a rotation.

5. *Influence of Summer Fallow.*—The summer fallow is a very effective way of making plant food available. Air and warmth are allowed to enter the soil freely, while the surface cultivation and absence of a crop are favorable to keeping the soil moist. These conditions bring about very rapid fermentation of the humus, causing it to give up its nitrogen, and the same conditions also render more or less mineral matter available. However, there are some very serious objections to the fallow, and one of the most serious is the exhaustive effect upon the humus. More humus has decomposed than would have decomposed under a crop, and a good deal of the soluble plant food thus formed will be leached out of the soil in drainage water. Consequently the summer fallow is effective but expensive, and wasteful of the precious humus, and is, therefore, to be avoided as far as possible.

6. *Influence of Lime.*—Lime can scarcely be called a fertilizer, unless on soils naturally very deficient in lime. Under some conditions, however, it has a very marked influence on the elements of plant food already in the soil. On sour soils, it neutralizes acids and thus makes the conditions more favorable for plants. It makes clay soils more open and friable, and thus air is more freely admitted with its beneficial influence on plant food. It hastens the decay of humus in the soil, and must, therefore, be used with moderation and great care, or waste will ensue. It is only in comparatively exceptional cases that the use of lime is advisable, and the advisability of its use must be determined by an experiment for each particular case.

7. *Influence of Gypsum.*—Gypsum, or land plaster as it is commonly called, was formerly used to a much greater extent than at present. It is believed to make the potash of the soil more available, but this effect seems to be much more marked on new soils than on those which have been cropped for a considerable length of time. As a result, its use has greatly fallen off. Experiment is the only means of determining its value for a given soil.

8. *Influence of Salt.*—The beneficial results frequently obtained from salt are not well understood. Salt supplies no plant food in itself, and no doubt its influence consists mainly in making the mineral matter of the soil more available. On some soils, however, it seems to have little or no influence, and therefore, as in the case of lime and gypsum, each farmer must determine for himself whether it will pay to use it or not.

Conclusion.—The more a person studies this question, the more forcibly he will be drawn to the conclusion that the great factors in making plant food available are humus and moisture, and we have already seen how the supply of moisture is largely dependent upon the supply of humus. The question of making plant food available is too large for a single paper, but perhaps sufficient has been said to set some person thinking and to tempt him to make further investigations.

VALUE OF HUMUS IN THE SOIL.

By A. C. Wilson, B.S.A., Greenway, Ont.

Humus is formed from the decaying vegetable and animal matter in the soil. It contains ordinarily 3-12 per cent. nitrogen ; therefore, a loss or deficiency of humus results in a loss or deficiency of nitrogen. As nitrogen is a valuable constituent in the soil for the growth of crops, we should endeavor to cultivate our soil in such a way that we shall have an abundance of this constituent available when required.

Some of the effects of humus are : First, it darkens the soil and allows heat from the sun to pass through. This makes the soil warmer and more capable of promoting germination. Second, it makes soils lighter in weight, bulk for bulk, and as a consequence we do not have so compact a condition of our soils. This condition allows free access of air and more room for roots of plants. Third, it diminishes adhesiveness of clay. Thus clay soil is made more friable and less liable to bake and become compact. The humus holds the water in the soil and thus prevents the cracking so often seen in our clay soils during the summer. Fourth, it increases water capacity, thus it is very valuable in soils that are liable to suffer from drouth. During the hot weather, soils with a limited amount of water suffer from drouth, but by having a good supply of humus we can increase our water capacity and thus ensure a supply of water for our crops. Fifth, it prevents soils from leaching. In the leaching of soils we lose very much of the fertilizing materials in the soil. Anything that will prevent this leaching is a decided gain to the land. As an example of the power of humus to prevent leaching, let me give you the result of an experiment performed at the Ontario Agricultural College. Two glass cylinders about three feet long, open at both ends, were nearly filled with perfectly dry soil, one with pure sand the other with humus. The bottom end of each tube was stopped with a piece of linen and a perforated rubber stopper. Water was poured on top of each and the time required to reach the bottom was noted. In the case of the sand the water reached the bottom in four hours, while the other stood for more than a month with three inches of water on top, and then the water had not reached the bottom. The decline in the crop producing power of many soils is due to a loss of partially decomposed animal and vegetable matter known as humus. What we farmers want to-day is the best crops possible. How are we to get these ? Is it by continued cropping of our soil ? No ! It is only by the systematic rotation of our crops and the return of humus-forming materials to the soil. The humus of the soil is decreased by continued cultivation of grain, roots, or any crop with which the land is kept continually under the plow without the addition of materials to form humus. The loss of humus involves the loss of nitrogen, which is one of the elements composing humus. The loss of nitrogen from the soil is not always due to the nitrogen removed by the crop, but is frequently caused by waste of the humus by improper methods and systems of cultivation. How may we increase the humus in our soils ? It can be increased by the use of well prepared farm-yard manure, green manures, and by systematic rotation of crops, in which grasses, or preferably clover form an important part. Each of these methods is a subject in itself, so I will not attempt to enlarge upon them.

As mentioned above, humus increases water capacity of soils, therefore a lack of humus in the soil results in decreasing its power of storing up and properly supplying crops with water. Soils with a liberal amount of humus are capable of more effectually withstanding drouth than similar soils with less humus. In arid regions the loss of humus from the soil is more serious than in regions of continuous summer rains. By having our soils well supplied with humus we do not need to depend so much upon the summer showers. With a good supply of water our crops would continue to advance during the hot weather instead of going back, as they generallly do. In sandy soils the loss of humus is most severely felt, because without humus the water will percolate below the roots of the plants and out of their reach. In poorly drained soils where there is a deficiency of lime, potash, phosphoric acid, and other materials, the humus may form sour moulds, but this may be overcome by the use of marl, lime, or wood ashes, the action of these materials being to break up these moulds and make the soil friable. Humus forming materials, like the decaying animal and vegetable matter in farm-yard manures, have the power of combining with the potash and phosphoric acid of the soil to form humates, which are readily assimilated by the plants when acted upon by the proper soil organisms. These humates then increase to a marked extent the available plant food of the soil. Thus farm-yard manures and other humus-forming material are not only valuable for the elements of fertility which they contain, but also for the power of making the inert materials of the soil more available to plants. Therefore in soils where there is a good stock of reserve materials it is cheaper to cultivate fertility through the agency of humus than it is to purchase it in the form of commercial fertilizers.

Humus is detected in the soil by the following physical properties: (1) By the dark color imparted to the soil. (2) By the specific gravity. Soils with humus are lighter bulk for bulk, than soils without humus. (3) By the power to absorb and hold moisture (4) By the rate which water will move through or from the soil by capillarity, evaporation, or percolation. (5) By the expansion of the soil when absorbing moisture.

PRESERVATION AND CONTROL OF SOIL MOISTURE.

By Jos. Conn, Heathcote, Ont.

It is frequently said that there is a sufficient amount of moisture in the soil in the spring to produce an average crop, provided it is preserved and not allowed to become evaporated. This great truth is being demonstrated year after year, yet many of us do not observe it. The movement of water in the soil is due to capillary attraction, that is, the attraction which one particle has for another; and if one particle of soil be dry and its neighbor be saturated, this extraction will bring about a uniformity, and thus the water will continue to move from the saturated particles below towards the dry ones above. These particles attract each other in extent according to the intervening distance. If they are closely packed together this attraction is much greater than when they are loose, and so we can easily understand that capillary power is much greater in clay soils than in lighter or sandy soils. Where the particles are closely packed at the surface the water will readily and constantly be pumped up from below, as the moisture in the surface particles is evaporated by the heat of the sun. This evaporation can be checked to a great extent by frequent shallow cultivation, and the moisture in the soil can be preserved for the use of the plants. Capillary attraction can be more easily understood by first considering the rise of oil in a common lamp wick. The same great principle which governs the rise of oil in the wick governs the rise of water in the soil. If the wick be torn or its continuity broken in any way the progress of the oil is retarded in its progress upward. It is checked when it reaches the point where the particles of the wick are loose, or at a greater distance from each other. If the continuity of the soil be broken by shallow cultivation, the water is checked in its passage upward at the point where the particles are at a greater distance from each other, and its moisture does not rise to the surface to become evaporated by the heat of the sun but is preserved below to be made use of by the plants. With this explanation we should be able to understand why the field having a loose surface soil produces a much larger crop than the other where the surface soil was broken and hard and so allowed the moisture to the surface to be evaporated by the heat of the sun.

Not only can the moisture be preserved by judicious shallow cultivation, but it can be directed in its movement and be of special benefit to the plants. The above statement is largely confined to crops where the plants are in drills, such as corn and roots. It has been said above that there is a strong tendency to uniformity of saturations in soils. Now if the space between the drills be kept loose and mellow at the surface by frequent shallow cultivation, the water will change its course when it reaches this loose soil and move horizontally towards the drills to be taken up by the roots. When the surface of the drills is comparatively solid this must necessarily take place. This must, in dry weather, be of special benefit to small plants, such as turnips or rape, as almost the entire moisture can be directed towards the roots of the young plants. It may seem strange and perhaps useless labor to many to be cultivating the corn or roots daily in dry weather, yet to those who have given the subject some study it amounts to little less than watering the plants with a sprinkling can. We frequently hear from an experienced farmer the saying, plow deep in the fall and shallow in the spring. Experience and observation have proved that the above saying is, as a rule, quite correct, but there is a reason for it, and it can be explained by anyone who has a slight knowledge of the principles and laws of capillarity. We plow deeply in the fall in order to turn up as much of the subsoil as possible to expose it to the action of frost and other agencies. Why not do the same in the spring ? Because we break the continuity of the soil at too great a depth below the surface, and if it be dry weather the moisture will not rise sufficiently high to bring it within reach of the small roots, and consequently the plants must suffer. It is different from plowing deeply in the fall where the soil has an opportunity to pack again before seed time and be cultivated on the surface. The main difference between plowing deeply in the spring and deeply in the fall, as far as the moisture is concerned, is the difference in the height to which water will rise. This same difference, especially in dry weather, may make the difference in a large crop and a small one. Of course there are many other agencies to be considered, but as a rule we get the best results from our grain crop by plowing deeply in the fall and shallow in the spring, and to my mind this strongly emphasizes the importance of coutrolling the moisture in the soil. I think it better not to plow at all in the spring if can be avoided, but cultivate well the surface soil. We know that soil that is plowed in the fall gathers considerable nitrogen from the air through the influence of rain, snow, frost, etc. This is in the surface soil, and if we plow in the spring we plow this under.

There are many other points in connection with the subject, but I will not go into them all. I wish, however, to mention another common operation on the farm which has considerable to do with the control and preservation of the moisture in the soil. I refer to the operation of rolling. There are various results obtained by the operation, but we shall call attention to it only so far as it affects the moisture. Theory and practice point to the fact that the best results from our grain crops are obtained from rolling when the grain is small and the weather exceedingly dry. At this stage the roots are necessarily short and small, and unless the moisture rises very near the surface the small plants must suffer. It can easily be understood from what has been said that the operation will cause the moisture to rise to the surface and come within reach of the rootlets, and also supply one of the necessaries for seed germination. The process, however, greatly aids the evaporation of the moisture because it can readily rise to the surface. It is comparatively easy to preserve to a great extent the moisture in our hoed crops, because there is sufficient room to cultivate : but it is rather difficult in the case of grain crops. There seems to be no satisfactory implement by means of which they can be cultivated even for a short period after the grain is up. All we can do then, it to try and preserve it before we sow. As soon as we cultivate a field in the spring, the evaporation is checked, but on many farms the period of seeding extends over a number of days. We can readily understand that an enormous amount of moisture must escape before the last field is reached. When the surface soil becomes dry enough to work, all the land should be cultivated as soon as possible. Not only would such a system check evaporation but it would admit air and induce the necessary conditions for germination of seed. At all events every time the soil is moved there should be some definite object in view.

SURFACE CULTIVATION.

By Joseph E. Gould, Uxbridge, Ontario.

I am a firm believer in surface cultivation, and on my farm, at least have had good success. I have the largest crop of grain and straw this year that ever grew on the farm. When the drouth occured (commencing June 30th), the oat and pea crops did not suffer as in former years or as much as some of my neighbors' crops ; of course the wheat was safe. I am requested by the Superintendent to make this paper as concise as possible. I think, therefore, the system used in cultivating the crop of fall wheat (see photo) will demonstrate the process. I would state that the crop has been threshed, and yielded 43 bushels to the acre, no manure being used. In 1897 the field yielded a crop of clover hay cut the latter part of June. It was plowed inside of ten days *not more than four inches deep*, the roller was put on and the harrows followed the next day. At the end of two weeks the spade harrow went over it twice, followed by the harrows. On the first of September the cultivator was put on followed by the harrows, and on the sixth of September the field was sown. The attendant made a mistake in setting the drill and only sowed three pecks to the acre on three acres before I discovered it. It was then set to a bushel and a peck and the balance of the field sown. The first sown came up thin and the other much thicker. In the spring when the ground got dry and the frost was all out, the weeder was put on to loosen the surface and break up the crust. In about two weeks the operation was repeated without injuring the growing crop, which was then eight to ten inches high. Frequent showers brought it on rapidly and to my surprise the part sown three pecks to the acre was making nearly as good a showing as that sown thicker, and when cutting occurred little or no diffusion could be seen. I examined the ground closely and found when sown thin the plants stooled wonderfully, some stools having from 16 to 21 stocks to the stool. From this I infer that in wheat and oats we are wasting seed by sowing too much to the acre. The wheat was Dawson's Golden Chaff, and was bought at the Experimental Farm at Guelph. I followed the system of surface cultivation in all my spring crops. The land was ribbed up last fall. For oats and peas the spade harrow and cultivators were put on to level the drills, followed by the harrows twice or three times. The grain was drilled in and rolled and immediately harrowed. For the corn ground, a clover sod was turned down about the same time as the wheat ground. The spade harrow, iron harrows, and cultivator were used and then it was ribbed up. In the winter all the manure was hauled out and put in large heaps on the higher parts of the field. As soon as the frost was out and before the other seeding was finished, the manure was spread on the ground before the drills were hardened and worked in with the spade harrow and covered not more than 4 inches. Continual cultivation after the sowing (May 16th,) was kept up and a good crop is in prospect except where the frost struck it on July 11th, and that is coming on nicely.

The conclusion that I have arrived at is that surface cultivation, when properly performed, puts the plant food in the best condition and best position to be assimilated by the plant, and that surface cultivation preserves the moisture in the ground. I also believe that when the ground is cultivated in this manner there is not so much seed required for the white straw crops and that there is a surer catch of clover.

THE CULTIVATION OF THE SOIL.

By G. C. Caston, Craighurst, Ont.

We cultivate the soil with an object in view, viz., the production of crops. How to do this to the best advantage and with the least expense, so as to obtain the greatest results and leave a good margin of profit for our labor, and to do this without exhausting the soil, but rather to make it richer under our treatment, are the problems we have to solve in all our agricultural operations. The modern tiller of the soil must be a man of ideas. He must be a thinker and a reasoner. He must be a reader also—quick to grasp ideas and put them into practice. In short, he must keep abreast of the times, and even try to get a little ahead of them, if he intends to stay in the business. In all our agricultural operations we are simply controlling the forces of nature, and upon the skill which we exercise in doing this will our success depend. The fertility of the soil and its retention and restoration, moisture, weeds and their subjugation, are all important factors to be considered. The nitrogenous food in the soil is not available for the use of the cereals until it has gone through a certain process called nitrification. The condition under which this process is carried on is the presence of heat, air and moisture. By cultivation we assist nature to carry on this work, for by it we admit the air and retain the moisture. Scientific men tell us that there is a vast amount of plant food in the soil that is not available. Hence the importance of cultivation in order to facilitate this important process In the annual rainfall the soil receives a certain amount of its most important element of fertility, viz., nitrogen in the form of ammonia. The intelligent and progressive farmer seeks to retain the fertility of the soil by adding to this by the application of manure and by plowing in some leguminous plants, the most important of which is clover. But all these elements of fertility must be subjected to nature's process before they are rendered available as plant food.

One of the most important factors in the growth of plants that we have to consider is that of moisture. We must remember that water is the medium by which the plant takes up its food from the soil. Without it the plant must starve. In this Province of Ontario, subject as we are to periodical and long continued droughts, the importance of retaining the moisture in the soil can hardly be overestimated. It is not in the power of man to exercise any control over the rainfall, but he can prevent the escape of moisture from the soil by frequent cultivation of its surface ; not only this, but absorb a considerable amount from the air as well. Let us consider for a moment how this occurs and the reasons for it. Moisture passes up through the soil by capillary attraction. A good illustration of this process is in taking a dry brick, hold it for a while over a pail of water with the lower end touching the water and the water will rise in it till it becomes thoroughly wet to the top. We would be very much surprised if we knew the amount of water that passes away from an acre of ground in a single day during hot weather when the soil is never stirred. But by frequent surface cultivation we break up the upper parts of the capillary tubes by which the moisture is drawn off, and thus prevent its escape ; and it is for this reason that we speak of a cultivated and porous surface soil as the very best mulch we can have to retain the moisture. But how does surface cultivation add moisture to the soil as well as prevent its escape? Simply in this way, the moisture in the air during hot dry weather will be precipitated by coming in contact with a cool surface. Notice how quickly a pitcher of ice water will become covered with beads of moisture. The same process goes on in a cultivated and porous surface soil. The air getting access and coming in contact with the cooler moist soil underneath, precipitates its moisture in the same way. A very forcible proof of these facts is that you may dig down in a sod or stubble field during a drouth and you will find the soil as dry as powder, while at the same time in a field that has been regularly cultivated you will find the moisture right up to the surface. In view of all these facts the question arises, would it not pay to cultivate our wheat and coarse grains in the same way as we do our corn and roots? The experiment has been made by a private individual who sowed a piece of ground broadcast in the usual way. A piece of the same size was sown with the same kind of grain, but sown in drills wide enough apart to allow of cultivation. This piece was regularly cultivated just like a corn crop The results were that the cultivated parts yielded more than double the quantity of grain and of a far better quality than was obtained from the part not cultivated ; the difference in results far more than paid the extra cost of cultivation. Every farmer has noticed that where grain is growing along side of a root or corn crop there will be a fringe along the edge next to the cultivated ground of a dark green colour, the straw will be longer and the heads much larger than elsewhere in the field, simply because of the cultivation.

For the cultivation of our grain we would need an implement different from any we have at present The drills would have to be far enough apart to allow of cultivation between This might be done by using an ordinaay seed drill and closing some of the holes. For the first cultivation a Breed Weeder would do. but for the later cultivation an implement would be required with a high axle and with spring teeth attached in sections of three or four, with a division between each section. These sections would require to be movable on the axle so as to be set far apart or narrow according to the width of the row. By having the machine wide enough for four sections it would do four drills at once, and thus do rapid work It would need to be light enough for one horse. In sowing, every fourth drill might be left a little wider between than the rest, and let the horse walk in this ; the rest could be narrower. In this way grain could be cultivated till nearly ready to harvest, except, perhaps, peas. Cultivation would not be possible on these much after they laid down, unless in the case of such varieties as the Crown pea, which stands up pretty straight. With such an implement once perfected, a boy with a steady horse would get over a large piece of ground in a day, and the cost would be very small. If we knew exactly the shortage in our crops caused by drouths in this Province, taking the average for say ten years, we would be surprised at the amount lost from this cause alone. By such a system as I have outlined much less seed would be required, the quality of the crop grown would be far better, and the increase in yield would mean millions of dollars to the country. It is only by such a system as this that we can counteract the effects of severe drouths. The cultivation should be very shallow—a mere stirring of the surface soil, to break up the capillary tubes and to admit the air. This would be a step in the direction of intensive agriculture, by which we would produce as much on one acre as we would otherwise get from two.

NOTE BY THE EDITOR. Readers of the preceding paper may desire to read up further on this subject of growing wheat as a cultivated crop. Jethro Tull, of Berkshire, England (1680-1740), is the father of the horse-hoeing industry and the cultivation of wheat. He began his experiments in 1701 and published his results in 1731. "The Horse-hoeing Husbandry : or, A Treatise on the Principles of Tillage and Vegetation, wherein is taught a method of introducing a sort of vineyard culture into the corn field in order to increase their product and diminish the common expense." A new edition was issued in 1829 with introduction by William Cobbett. His methods were later followed out in improved form by Rev. S. Smith, of Lois-Weedon, Northamptonshire. A statement of the Lois-Weeden method of cultivating wheat can be found in Mortons' Cyclopedia of Agriculture, Vol. II. p. 1147.

The North Dakota Experimental Station (Fargo) issues, in Bulletin 29, an account of the study of the various methods of cultivation recommended for that dry State. Probably many have heard something about the Campbell system of raising wheat. This bulletin gives a very good account of this method and the results obtained from it in comparison with ordinary culture In brief, the Campbell system is about as follows : "The soil is first worked with a disc harrow, which gives it a thorough mellowing. It is then plowed seven or eight inches deep, so that the mellowed surface is turned to the bottom. Within a few hours after plowing the ground is worked with the Campbell surface packer, which, with its action is described as follows :

"This machine consists essentially of a series of cast iron wheels placed abreast upon an iron axle, so that their rims, which are about an inch thick at the base, narrowing to a sharp angle at the extreme circumference, are about five inches apart. The whole machine, when run over the soil, is heavily loaded. The object of the sub-surface packer is, first, further to pulverize the soil, and, second, to bring the newly turned soil (which is held up to a greater or less extent by the stubble) into contact with the bottom of the furrow. This packing of the furrow slice upon the bottom of the furrow renews the capillary relation between the newly-turned soil and that below, a thing desirable in a dry autumn, and also opens a way downward for rain, should there be any. It is well known that water does not percolate so readily into the soil that is dry and filled with air spaces as it does into one that is already moist and, while mellow, is not filled with large openings."

After this the ground is harrowed with a light peg-toothed harrow at intervals until the crop is sown. This keeps a shallow mulch over the surface of the ground, and retards the evaporation of the moisture into the air. All crops are sown so that they may be cultivated, grain being sown in rows sixteen to twenty-four inches apart. Cultivation, shallow and often, is kept up as long as possible. As compared with the ordinary method of plowing and harrowing and sowing the seed in the narrow drills or broadcasting, this Campbell system has, on the whole, proved very useful. One statement made in this bulletin is certainly well considered, namely, "Soils have their individualities. The treatment that would cause one soil to give good returns might bring about very different results in another. The farmer must study the character and disposition of his land no less than he would those of his horse." It would be well if farmers generally would think that over, and try to handle their soil in such a way as to obtain the best possible returns from it. The cultivation of the crop, however, is no new thing, This has often been practised in England, and to some extent in the United States heretofore, with the result of producing eighty bushels of wheat to the acre.

CULTIVATION OF THE SOIL FOR CORN AND GRAIN CROPS.

By Thos. McMillan, Seaforth, Ont.

The plants of the farm are composed of many different elements united in various combinations which go to build up the structure of the plant, and without a sufficient supply of a large number of these elements it is not possible to bring the plant to perfect maturity. The sources of plant food are two-fold, the atmosphere and the soil. No plant, however, can live entirely upon either air or soil ; it must draw something from each source in order to ensure its perfect growth. The elements which constitute air remain practically the same ; with the soil it is otherwise. The available supply of plant food which the soil contains depends, first, upon its original composition, and second, upon the system of treatment to which it is subjected. It is quite possible to work land, even a fertile soil, in such a way, and subject it to such a system of rotation that in a short time it will cease to produce a satisfactory return. The composition of the great bulk of our soil is such that, with proper treatment there is little danger of impoverishing it. Therefore, to farm land, in order to obtain the largest yield from year to year, is a question of the most vital importance to all farmers.

In discussing any system of cultivation there are two points which, if borne in mind, will be of great benefit. The one is, no matter how fertile a soil may be, there is very little, probably not more than one per cent. of its substance, in a fit condition for nourishing our crops at any one time ; that the great percentage is in a tied-up, unavailable condition and only liberated by the action of air, moisture, heat and manure. Thus we see that the soil is simply a great laboratory in which its elements are constantly being prepared for the use of plants ; and its efficiency as a crop producer at any time depends upon its condition being such that these elements will be able to perform their work properly. The other point is, although the structure of plants contains a large number of elements which must be supplied before the crop can possibly be grown, yet with the exception of three of these elements any ordinary soil contains an abundant available supply for an indefinite period of crop production. Thus the question of maintaining and increasing the fertility of the soil is much simplified from the fact that it resolves itself down to the consideration and supplying of these three elements, known to scientists as nitrogen, phosphoric acid and potash. Therefore, a great part of the knowledge of the principles underlying grain growing consists in knowing how to supply and liberate these three elements of the plant food, and how to secure them after they are liberated.

In order to secure their liberation chemical action must be constantly kept up in the soil during the whole period of growth. This process is kept up principally by means of the oxygen in the air getting in and through the soil, and it requires for its perfect action a soil which is porous, warm and moist, because the more porous we find a soil the less adhesive are its particles and the greater will be the amount of surface exposed to the action of the air which penetrates it. These conditions are secured first by a thorough system of underdraining followed by a proper method of cultivation. Having got rid of any surplus water by drainage, we may proceed, and may be assured that the land will respond to a proper system of tillage, which includes all the ordinary operations, including plowing, harrowing, rolling, and anything else which is done to bring the soil into a proper condition to receive the seed. In the first place I may say, that no matter what the condition of a soil may be it will produce very little grain crop without being turned up and exposed to the action of the atmosphere; the surface soil having been thus exposed is in a good condition for turning under and the under soil will be freshened by exposure. Land packs and gets to a certain extent solid during the process of the growth and removal of crops; therefore it requires to be broken up to allow the small rootlet of plants to penetrate and search for food.

In talking of the mode of cultivation to be adopted in the growing of grain and corn crops, reference should be had to the place which they hold in a general system of rotation, as I find from experience that the large yield of our different crops depends as much, if not more, upon the nature of the alternate crops which we grow and the condition in which they leave the soil, as upon the particular method of cultivation which we give; not only this, but the method of cultivation which we do give must depend greatly upon the system of rotation which is followed. In the growing of the various crops every farmer should have in his mind some definite system of rotation which he seeks to follow, in order, first, to keep the land clean of noxious weeds, and second, to economize the elements of plant food, which are being constantly manufactured in the soil and applied in manure, and thus fit the soil for producing from year to year the largest possible yield. The three year rotation is the system which I seek to follow, making clover my foundation crop, to be followed by corn, roots, and fall wheat, and seed again to clover the following season with the oat and barley crop. After harvesting my clover crop I plow the portion of my clover stubble which I intend for fall wheat. After plowing, not too deep, I make the seed bed for the wheat with the roller, the spade harrow and the iron harrow. For the wheat, if the surface is mellow and of good tilth, I like to have the under soil comparatively firm. After the wheat crop is removed, the land should at once be well cultivated upon the surface, and later in the fall plowed a good furrow, after which it is left till the following spring, when the oats or barley and the clover are sown after the soil has been brought to a fine seed bed by thorough surface cultivation. For the corn and root crop I plow my clover sod in the fall, not too deep, and spread on the manure in winter. In the spring the land is thoroughly cultivated with the spade and iron harrows and the broad tooth cultivator. Mangels are sown with seed drill, and the corn planted in hills. During the growth of these crops the surface soil should be kept thoroughly cultivated, making, as it were, a blanket of the surface soil, to prevent the evaporation of moisture, which otherwise will go on rapidly if a crust of earth is allowed to form on the top of the soil. After the corn crop is harvested, cultivate the corn land with the one-horse cultivator, as was done during the growing period, and in this condition it is allowed to remain until the following spring when a seed bed for the grain and clover seed is made with the spade harrow and the iron harrow. The grain is sown with a shoe drill and the clover seed dropped in front of the drill shoes.

When we know that the clover plant has the ability to gather the free nitrogen from the atmosphere, and the phosphoric acid and potash from the subsoil, and store these elements up in its roots for the benefit of future crops, thus supplying, to a large extent, the only elements of which our soils are in danger of becoming impoverished, it becomes evident that clover is such an all-important crop in our system of farm operation that it may well be called "the farmer's friend."

THE CANNING FACTORY IN RELATION TO THE FARMER

By J. F. Taylor, West Lorne, Ontario.

In speaking of the subject of "The Canning Factory in Relation to the Farmer," I would draw your attention to the fact that the canning factory is the result of an endeavor to furnish vegetables and fruits at all seasons of the year in a convenient package, air-tight, where they will keep a long time in their best condition as to ripeness and natural flavor. The processes by which this object is accomplished are now acknowledged to be entirely satisfactory, not only in the keeping of the goods but also in the retaining of their natural flavor. The bulk of the produce grown by the farmer for the canning factory is now packed in tin cans and consists of tomatoes, corn, peas, string beans, pumpkins, etc., also all kinds of small fruits, apples, peaches, pears, plums, etc. Before passing on to the consideration of the different crops, their cultivation, yields, etc., I wish to mention the fact that as the canning factory enlarges the market for the produce used, besides employing a large number of hands, the desire to have a canning factory in the neighborhood has multiplied them considerably faster than the market for their produce warranted, causing serious and heavy losses to the owners of the factories. This has naturally resulted in the general cutting down of the prices paid to the farmers for the produce, but even at the present low ebb of prices paid, the farmer who is within range of the canning factory may consider himself fortunate. Of this a short comparison of the returns from the canning factory produce, with the returns from wheat, oat beans, etc., will convince any one who takes the trouble to compare results.

The arrangements usually made between the farmer and the canner is in the form of a contract on the farmer's part to grow a stated number of acres of the different crops, tomatoes, corn, peas, etc., to use seed approved by the canner, give the crops first-class soil, care and cultivation, and to pick and deliver his produce to the factory according to the canner's regulations; the canner, on his part, agreeing to receive all his produce, and pay certain prices for such produce at times agreed upon between them.

The principal crop is, doubtless, tomatoes, of which only large, smooth, bright red solid varieties are used, such as Livingstones, Perfection, Royal Red and others. The first essential is a good hot-house to raise the plants in, so as to have good, strong, healthy plants to set out. This should be done about the end of May or the beginning of June, in first-class well-worked land. They should be placed in rows from four to four and a half feet apart, each plant the same distance apart in the row. They must be well cultivated and taken care of in order to bring the crop to maturity as early as possible, for in our climate frosts usually destroy the late tomatoes about the end of September or beginning of October. The yield of tomatoes varies greatly, a fair crop being from 350 to 450 bushels, although 600 bushels can be grown, to the acre. The prices paid range from 15 cents to 25 cents per bushel at the factory.

Sweet corn is the next crop in importance, and the farmer who raises Indian corn successfully can raise this crop. The varieties chiefly used are Stonewall's Evergreen, Crossley's Early, Egyptian, and a few others of the same class. The corn is planted and cared for like Indian corn, but great care must be taken not to allow any Indian corn or pop corn within at least fifty rods of the sugar corn while growing or they will mix, and some of the sugar corn will be found to be worthless for canning purposes when picked. When the ears are tender and juicy, just fit for cooking for table use, the corn is fit to pick. The ears are broken off close to the butt, put in wagons and brought to the factory the same day they are picked. Here the loads are weighed and the corn is paid for per tons of ears. The yield varies from one and a half to five tons of ears per acre, a fair crop being from two and a half to four tons, and the price received ranges from $5.00 to $8.00 per ton of ears.

Table peas come next, and this is getting to be a very important crop. The varieties used are Horsford's Market Garden, McLean's Advancer, Little Gem, Champion of England, French Canners, and a number of others. They are usually sown in May, either in drills or broadcast; if broadcast, two bushels of seed should be used to the acre. The peas, when ready for picking, are either cut with a mower for the canner, who has a thrashing machine, or the pods are picked off by hand and brought to the factory in bags for those factories that have pea hullers. The peas are usually paid for per bushel of pods, averaging thirty pounds of pods per bushel; there, also, the yields vary greatly, from 100 bushels to 350 bushels of pods per acre, while the price ranges from 30 cents to 40 cents per bushel of pods.

As the other crops used, small fruits, etc., are more in the line of the market gardener than the farmer, it is hardly necessary to discuss them here, but for apples, peaches, plums, cherries, etc., the farmer has a strong interest in the canning factory as a means of using up the products of his orchard. Apples are largely canned, being packed in six pound cans, and exported to Great Britain and the continent of Europe, where the name of "Canadian canned apples" is a guarantee of the finest quality of canned apples. Peaches and pears are very extensively used by canners, and the demand for this class of goods appears to be increasing yearly.

THE INTRODUCTION OF ECONOMIC PLANTS.

By Dr. William Brodie, Toronto.

For many years to come mixed farming will be the rule and the practice in Muskoka—that is cattle raising combined with the raising of cereal, root and fruit crops. The raising of young cattle and sheep to supply the demand of feeders in the southern counties, may be for sometime a lucrative industry, and here, as everywhere in the realm of life, the food question is the all-important one. And as you have here in Muskoka—and what will be for many years to come—a large area of partially cleared land, outside of cultivation, outside of your fences, of very little value as pasture, giving a scant yield of herbage, if any forage plant can be introduced which will thrive on these waste lands, without cultivation or care, supplying good pasturage and so making these waste lands of much greater value, it is surely a matter well worthy of consideration and experiment.

In estimating the real value of a plant we have to consider more than the immediate economic value. All plants are more or less fertilizers—the lichen, the mosses, the common bracken, are good fertilizers. All the vegetable soil, the humus, the world over has come through the agency of plants. Plants take very little from the soil and they put a good deal in. The ash is what a pine tree has taken from the soil, nearly all else is from the air. Land destitute of any vegetation is at a stand still, or perhaps in some cases it may be deteriorating; but where there is but a meagre growth of grass, even when this is closely cropped by sheep, the land is enriched to some extent by the annual decay of rootlets.

In vegetable physiology there is what is called the "Transpiration of Plants." This is a continual taking up of water from the earth by the roots, passing it upwards through the stems or trunks and giving it out through the leaves. A stupenduous mechanical power is thus wielded by plants. An acre of heavy meadow grass will raise and transpire barrels of water in one day. Our forests are raising and transpiring thousands of tons of water daily. This transpiration of water by plants supplies moisture to the air, perhaps more abundantly than evaporation. And it should not be forgotten that the occupancy of the soil by plants of economic value may keep out a host of pernicious weeds such as *sheep burrs* or *beggars' ticks*.

The most of the plants recommended in the following list are believed to have those advantageous qualities.

First—They will thrive and endure outside of cultivation.

Second—They will endure as permanent pasture.

Third—They may be cut for green fodder.

Fourth—They are useful for silo purposes.

Fifth—They are good honey plants.

Sixth—They are good general fertilizers.

I begin the list with.

Medicago sativa. Alfalfa, Lucerne clover. This is a perennial plant, and after the first year holds its place in meadows and pasture fields for many years. It can be cut for green fodder three times in one season When mixed with timothy grass it makes good hay, it also does very well for the silo. It is also a good honey plant, and one of the best fertilizers, the roots being large and penetrating to a great depth in the soil. There can be little doubt that the introduction of Lucerne on the waste lands of Muskoka would be of much advantage to the dairying interest there.

Melilotus alba. Sweet clover, Bokhara clover. A biennial plant which seeds itself freely, very hardy and grows on a great variety of soil, extensively introduced as a honey plant, of which it is one of the best, commencing to bloom early in summer and continuing until frosts sets in. Cattle and sheep feed on sweet clover when it is young, it does well for the silo, and is a good fertilizer, the large roots penetrating to a considerable depth.

Melilotus officinalis. Sweet clover, Yellow melilot. Very similiar to the last, a better honey plant.

Astragalus Canadensis. Milk vetch. Perennial plant recommended for permanent pasture, and for silo purposes. It is also a good honey plant and a good fertilizer, grows best on damp soil, such as old beaver meadows, well worth a trial.

Vicia Cracca. Wild vetch. A native perennial plant, flowers and seeds profusely thrives best on damp situations where it holds the ground well. Suitable for permanent pasture, green fodder and for silo purposes. This is also a good honey plant and a good fertilizer

Lathyrus maritimus. Beach pea. A native perennial plant. Suitable for permanent pasture, green fodder and for the silo; it is also a good honey plant and a good fertilizer. This is a fine vigorous hardy plant growing on a great variety of soil, usually upon high, dry banks, it has stout and long running horizontal roots. Well worth a trial.

Symphytum officinalis. Comfrey. A well known and extensively cultivated annual plant. It is eaten by cattle and sheep affording good permanent pasture as it freely seeds itself in favorable situations. It can be cut for green fodder or for the silo, and is a good honey plant. It is a firm, vigorous grower and a good fertilizer.

Chicorum intybus. Chicory. Formerly extensively cultivated for the roots, which were used as a substitute for coffee. It is a perennial plant and holds its place in the soil tenaciously for years. It is relished by horses, cattle, sheep and pigs. Good for permanent pasture; for the silo, is a good honey plant and a good fertilizer. No doubt it would take well on the waste lands of Muskoka.

Scrophularia nodoso. Square stem. This is an indigeuous annual plant, tall and hardy, seeds itself freely. It begins to flower early in the season and continues until the fall frosts. This is not a fodder plant, but it is one of the best honey plants and is worth introducing on this account alone. It grows in open or shaded situations where other plants would not thrive.

Cannabis sativa. Hemp. Hemp is a hardy annual plant, yielding abundance of seed and holding the ground tenaciously to the exclusion of other plants for many years. There are localities near Toronto where it has held its place, seeding itself annually, for a century. Hemp grows best on damp soil, old beaver meadows or partially dry marshes, such as abound in Muskoka. It could be cut or pulled in the fall season and taken out on sleighs during the winter or allowed to stand until the following spring. There is a good yield of seed, from 600 to 1,000 lbs. per acre. The wholesale price of hemp seed is about 2½ cents per lb. It could be used as food for fowls during the winter, and it would be a source of food supply to game birds and animals. But the greater value is in the fibre. An acre of good hemp will yield $50 worth of fibre. Hemp fibre is used for fine cordage, for twines and for paper making. There can be little doubt that hemp fibre combined with a wiry species of native grass, which is common in Muskoka marshes, could be utilized for binder twine. I would not suggest the cultivation of hemp, but the growing of it outside of cultivation, on partially dried marshes and on old beaver meadows, at present unproductive, would in all probability be remunerative. There is a native grass common in Muskoka growing everywhere over waste clearings and burnt-over commons. It is known to Botanists as *Danthonia spicata.* The common name is Wild Oat grass. Is is said to be a nourishing pasture for cattle and sheep in spring and early summer, but it is sparse on the ground, and there is very little after-growth. And it is pretty certain that this native grass could be profitably replaced by two common species which have been more or less in cultivation for more than a century, and still rank very high, perhaps the best grasses for permanent pasture in Ontario.

Poa pratensis. Spear grass, Kentucky blue grass, June grass. There are patches of this grass in Muskoka now, and no doubt in time will take possession to the exclusion of more local and tender species in permanent pastures; it would be well to seed waste places with spear grass as soon as possible.

Dactylis glomerata. Orchard grass, Cock's foot grass. This is a fine, hardy, vigorous-growing, leafy grass, one of the best for permanent pastures, thriving equally well on light sandy and heavy clay soil. This grass has given complete satisfaction wherever tried. No doubt it would prove a great success on the burnt-over waste lands of Muskoka.

EDITORIAL NOTE. Some of the plants spoken of by Dr. William Brodie in the foregoing article have long been considered weeds by Canadian farmers. In this connection I would particularly mention Bokhara clover, but in carefully looking the matter up I find that several of the American experiment stations have taken this plant up and have carefully experimented with it. The following is abridged from an article published in the hand book of the experiment stations' work published in Washington in 1893. See page 202.

Melilotus, (*Melilotus alba*) (also called Bokhara clover and large white clover). Uses.—Melilotus resembles alfalfa, but grows much taller (3 to 8 feet) and bears a number of small white flowers. It is biennial and will reseed itself indefinitely. It thrives on calcareous soils, making some growth even on the bare rotten limestone, where no other plant could subsist. On the black prairie soils of the South, and on the yellow loam and white lime soils, it has a high value as a renovating crop. These black prairie soils, most of which do not respond to commercial fertilizers, are easily improved by seeding to melilotus. The decay of the large roots not only supplies plant food, but by leaving numerous small holes in the soil aids in the drainage. Melilotus is valuable both for pasture and for hay. At first animals refuse to eat it, but later relish it. It makes an early spring growth and remains green late in the fall. In Nevada, melilotus grew well along streams but did not thrive in dry situations.

On the lime sands of the South, for early and late pasturage and for restoring the fertility of exhausted fields, it has no superior among the clovers. When cut early it is a valuable hay crop, but in this respect it is surpassed by lespedeza and red clover. Though melilotus grows in lime soils North and South, it has been appreciated chiefly in the South. In some States farther north it is considered a weed. As a renovating crop it merits trial on calcareous soils in every latitude. Melilotus has also some value as a bee plant. It has been tested at the Massachusetts State Station, giving a smaller yield of hay than timothy. The best reports come from the Mississippi and Alabama Canebrake Stations, where the land is highly calcareous. At the Mississippi Station it thrives best on soil richest in lime—where the rotten limestone is near the surface—making less thrifty growth on clay hills and rich bottoms.

Culture.—Very early in the spring is the best time for sowing, From two to four pecks of seed per acre should be sown broadcast. A smaller amount of seed will give a smaller crop the first year, but will suffice if the plant is allowed to reseed itself. Sow the seed on well prepared land and the winter rains will cover it. Or if the land is not in good condition, harrow after sowing. Melilotus may be sown with spring grain or the seed may be scattered over a field of fall sown wheat.

Harvesting.—During the first season one or two cuttings may be made; during the second two or three. If the land is to remain in melilotus more than two years, only two cuttings are made the second season, after which there is usually sufficient seed formed to insure a stand. It is important that melilotus be cut before the stalks become coarse and woody. From 15 to 20 inches is the best height. The first cutting of the second season is secured about May 1st in southern localities. Melilotus produces a heavy growth of hay, which, though excellent for home use, is not so saleable as that made from some other plants.

Melilotus must be cured with care, as too much sun causes shedding of the leaves. At the Massachusetts State Station it produced at one cutting 3,090 pounds of hay per acre the first season; its yield is much heavier the second season.

Rotation.—Corn, wheat and oats all succeed well on a field that has been in melilotus for two years. Such rotation sometimes increases the corn crop from 10 or 15 to 25 or 30 bushels per acre and upwards When it is desired to run the land in melilotus more than two years, seeds must be allowed to form, and these may be left as they fall, or the land may be harrowed.

GROWING POTATOES AND PREVENTING DISEASES.

By Alf. Brown, Picton.

The abundant crops of 1895 and 1896, together with an overstocked market and low prices, had the effect of many growers becoming indifferent in caring for the crop of 1897, the result of which was a light yield of poor quality. The heavier soils are not capable of producing the best quality of potatoes at any time. The lighter and more suitable soils did not give satisfactory yield and quality in 1897, on account of the plants being killed by blight long before completing their growth. The writer invites the indulgence of the reader while briefly giving his experience on this subject. No attempt will be made to describe the diseases of the potato, as this is done in a very practical way by Prof. John Craig, in Farmers' Bulletin No. 23, of the Central Experimental farm, Ottawa.

Rotation. We practise a three years' rotation, as nearly as possible, on all our land except what is down in pasture and fruit, and depend on medium red clover to keep up the fertility. It may be said that we go through our rotation backwards, or in the opposite way from the common practice. Most people apply manure to the land before the hoed crop; we top dress in the fall and winter, after corn, potatoes, or whatever hoe crop we use, hauling and spreading directly from the stables whenever the ground is frozen enough to bear a team. Our object is to mulch and fertilize all we can, to insure a good catch of clover which is sown with the grain crop. All corn is cut for the silo, and all straw used for food or bedding is cut, so that there is no clogging of implements in working the manure in the surface soil with harrow and cultivator.

Cultivation. Cultivation is commenced by plowing the clover sod late in the fall and harrowing, cultivating, and gang-plowing in the spring; and when ready to plant in May, strike out and plow in wide lands, dropping fresh cut seed, fifteen inches apart, in every third furrow, and six inches deep, the furrows thirty six inches apart. Two good hands will, with curved knives, cut and drop the seed as fast as the ground can be plowed by one team. Harrow crosswise and lengthwise every few days until the plants are three or four inches above ground. If the work has been well done up to this time there will be little need of a hoe in the field. Scuffle on the level, for the more ridging that is done the more surface will be exposed to be dried out by the sun and wind, and the greater amount of soil moisture will be lost. We scuffle once a week, or as soon as the soil is fit to work after every shower, up to the time the plants shade the ground,—deep at first, but finishing at an inch and a half. If from drenching rain or other causes the soil gets so firm that the tubers are showing above the surface, we use the hillers on the scuffler, covering the row enough to keep them from being sunburned, as the common phrase goes; but it does not require the sun to make a potato look green; the light from a small cellar window will destroy the quality of the best potatoes. To prevent this we keep the bins covered with a mat, or anything that will exclude the light, and the quality will compare favorably with the ideal way of wintering in pits.

SCAB. The scab is a fungous growth on the skin of the potato, making it unsightly for market and causing considerable waste in cleaning for the table. To kill the scab we first wash the seed so that the preparation reaches every part of the skin Make the solution with one ounce of corrosive sublimate dissolved in one gallon of hot water, added to seven gallons of water, or in this proportion for any quantity required. We use the sheep dipping tank; but two barrels or an oil barrel sawn in two will answer the purpose. Leave the potatoes in the solution ninety minutes, then draw off the solution in the other barrel or in any wooden vessel, or dip out the potatoes when they are ready to cut and plant, and they will not produce a scabby crop unless they are handled in crates or bags that have had scabby potatoes in them, or planted on land that has produced a crop of scabby potatoes. There has been a popular opinion that fresh stable manure caused the scab. We staked out a plot and applied fresh manure directly on the seed after dropped, but the crop from all parts of the field was smooth and clean, including this plot. This plan takes a little additional time and expense, but we have found it to pay us well from ready sales at top prices.

BLIGHT. Early in August, 1895, we noticed the under and older leaves on our potatoes showing brown patches; these patches were then spreading rapidly. Although too late to get the best results, we undertook, in the middle and at the end of August, to spray with Bordeaux mixture, with only crude implements at our disposal. The result was an increased yield of thirty-six bushels to the acre from the sprayed over the unsprayed parts of the field; 1896 found us prepared to do first class spraying at short notice, and again the blight commenced during the last days of July. We made three sprayings with Bordeaux—the first, middle and end of August. At the time of the last spraying we found the unsprayed rows completely dead with blight, while the sprayed rows were quite green and remained so up to the time of frost—late in September, and yielded 87½ bushels to the acre more than the unsprayed rows. The same variety (Empire State) was used for the test, all planted the same day, under the same conditions, and each received, as far as possible, the same care with the exception of spraying. At Cornell University Agricultural Experiment Station, in 1897, the potato plot cultivated on the level, yielded 325 bushels per acre against 288 bushels per acre from hilled rows, showing a larger yield in favor of level cultivation of thirty-seven bushels per acre. The experiment was with Carman No. 3. At the same station the R. N. T. No. 2, unsprayed, with five cultivations, yielded 234 bushels; sprayed four times, with five cultivations, yielded 305 bushels; sprayed four times, with seven cultivations, yielded 347 bushels; showing an increased yield of seventy-one bushels per acre from spraying for blight, and an increased yield of 113 bushels per acre as the result of spraying and two extra cultivations.

FLEA BEETLES. The flea beetles are very troublesome, some seasons doing considerable damage to the young plants, enfeebling their growth and making them an easy prey to disease. Neither Paris green nor Bordeaux kills this pest, but the latter seems to be very offensive to them, and they hunt new feeding grounds when it is used.

SPRAYING OUTFIT. Our outfit consists of a spramotor No. 2 with eight feet of hose connecting the pump to the centre of a nine-foot piece of gas pipe, with four nozzles arranged in it three feet apart. With this we can spray four rows of potatoes as fast as a horse can walk. The barrel, pump and all are mounted on a cart made with two rake wheels six feet apart, so that when the horse is walking between two rows the wheels are running between the next two, on either side. Two men with this rig will mix and apply a fifty-gallon barrel of Bordeaux or Paris green solution in forty-five minutes if the water is not more than forty rods from the field to be sprayed. At ten cents an hour the expense of applying a barrel is fifteen cents. One fifty-gallon barrel is sufficient to spray an acre of potatoes once except when the vines are very heavy. Four ounces of Paris green to the barrel of water is enough to destroy the young Colorado beetles, but if they get nearly full fledged, double this amount will be required. The total cost will be from nineteen cents to twenty-three cents per barrel, including material and time for spraying. For Bordeaux we use six pounds copper sulphate and six pounds fresh lime, costing forty-seven cents per barrel applied.

VARIETIES. The best varieties ever introduced have lost in vitality in a few years. This makes it necessary to originate new sorts. It is very interesting work and might be taken up by our young people. Care should be taken to gather seed balls from the best varieties. Wash out the seeds in the same way that tomato seeds are washed, and dry. Plant in a box in a window, hot-bed or green-house, early in the spring, and transplant into berry boxes or flower pots before the plants begin to spindle up, and transplant again into the open ground as soon as danger of frost is over, and give the same care as for a field crop. Seedlings the first year will be of different sizes, shapes and colors, and perhaps different in type from the parent stook. Select only the fittest the second or third seasons, and in this way we may originate new varieties equal if not superior to any in cultivation. Our first seeding was the Rot Proof (which has not proved to be free from rot in all sections, but at home has never shown any development of the putrid rot caused by the late blight) yielded, in 1897, at Agassiz, B.C., 454·40 bushels; and an average at all the stations of 308.11 bushels; at home it yielded 309.15 bushels as compared with 265.30 bushels of White Star and 206 bushels of Beauty of Hebron per acre. The yield and shape is quite satisfactory, but the dark red skin is against its appearance for market, A number of seedlings are being tested. The Burbank, R. N. T., Empire State, Vicks' Perfection, Great Divide, and others have been tried for market and give good yields, but customers will not buy them if they can get potatoes of better quality. The Hebron, Elephant, Pootaluck, Early Norther, Freeman, and Pearl of Savoy are of good quality but will soon need replacing with new blood.

CONCLUSION. The early and late blights can be prevented by a timely use of Bordeaux mixture, and it is just as effective as Paris green for the potato bug; both may be applied together if necessary. Every acre of potatoes we sprayed during 1896 and 1897 gave us enough profit over the unsprayed to pay for a first class spraying outfit. Unsprayed rows were immature and of poor quality, similar to those found in many parts of New York State, Ontario, Ireland, and other countries. Both years' spraying gave satisfactory yield of good quality.

GROWING CORN, SUNFLOWERS AND HORSE BEANS FOR THE SILO.

By JOHN FIXTER, EXPERIMENTAL FARM, OTTAWA.

Corn will do well on almost any soil that is rich and contains a good deal of humus and is well drained. It is a deep feeding plant and requires a deep free subsoil, but does best on a sandy loam. There are three points to consider when selecting corn land: First, select a field that has had grain and clover sown the previous year, and allow the clover its full growth. Just before corn planting plow a good swarth under and plant your corn. Second, select a field that has had clover or meadow one or two years. Plow shortly before planting so as to work the soil thoroughly. Third, if a field requires cleaning of weeds, plow very shallow or cultivate immediately after the previous crop comes off, and cultivate sufficiently when the sun is very warm to keep all growth below the surface. This is an excellent plan for killing scutch grass or Canada thistles. Manure during the autumn and winter in every case, and plow under in the spring. The manure may be spread in the autumn while there is no snow. As soon as snow comes to stay for the season put out manure in very small piles so that it may be spread immediately after the snow goes in the spring. The manure will help the growth of grass and clover as well as the corn afterwards.

Those having no silo should select varieties for grain and fodder as follows: Longfellow, Compton's Early and Canada White Flint. These three may also be selected for part of the ensilage crop, especially in this district. The later varieties, suitable for more southern parts, are Champion White Pearl, New White Cap, Yellow Dent, and Selected Leaming, but a judicious combination of some early varieties with the later ones prolongs the season of handling and cutting, which suits this section very well. The best time for sowing is from the 15th to the 24th of May; in any case see that the soil is warm and dry. If cold and damp the corn is very easily rotted. Plant in hills three feet each way, four to five grains to the hill; sow with the common grain drill in drill three feet apart. Sow about twenty-four pounds of seed per acre and thin out to from four to six inches in the drills.

Cultivation. Harrow a few days after the corn is planted, then again after it comes up, and again when about four to six inches high. Cultivate close and fairly deep the first time, afterwards shallower and further away from the plants. Keep up the shallow cultivation at intervals when the soil is dry until the corn is so high that Mary has to ring the cow bell to find you.

Time to Cut. For grain, allow the corn to ripen. For ensilage, cut when the cob is in the glazing stage, or when in good condition for boiling. There are excellent machines for cutting and binding corn which leave the sheaves on the ground of a size easily handled both in the field and barn. Hand cutting is best done by a corn hook made especially for corn. The stalks should be left in convenient piles for handling.

Drawing to the Barn. The best plan is to use a corn rack hung below the axles of the ordinary waggon. Cut the ensilage from one-half to three-quarter inch lengths, and while the machine is running have one man or more, according to the amount going into the silo, levelling and trampling, especially the sides and corners. If convenient, put a horse in to tramp also. Do not leave the surface exposed more than two days without covering. Tramp the surface thoroughly; put on three inches of cut straw or chaff, tramp it also and put in three feet of straw on top. This may also be packed closely. Ensilage may be fed at once.

An excellent mixture for feeding is made up as follows; Ensilage mixed, fifty lbs.; oat straw cut, ten lbs.; (give as much as the animal will eat up clean morning and night) mixed grain, ground, four lbs. per day. For the noon feed,—roots and long hay.

SUNFLOWERS.

The importance of encouraging farmers to grow sunflowers is very great, as the seed of this plant makes excellent feed for any kind of stock, especially when fed mixed with corn ensilage.

Selection of Soil. The sunflowers is a deep feeding plant and will do well on almost any soil that is fairly rich, in good condition and well drained; but it does best on a heavy sandy loam that has a deep, free subsoil.

Preparation of the Soil. The land should receive a dressing of green barn-yard manure in the autumn. Plow under four inches deep, and on the same plow use a subsoil attachment to loosen the subsoil five to six inches deeper. Care must be taken not to plow when the soil is wet as the land will puddle if worked when wet. In spring all that is necessary is to disc harrow, then harrow with smoothing harrows and sow your seed.

Best Varieties. Mammoth Russian Black and Colored seed.

Time for Sowing. Sow as early as the soil will allow, using three pound of seed per acre. Sow with the common grain drill or any small hand seed drill. The grain drill may be arranged the same as for sowing corn. Sow in rows three feet apart and thin out to eighteen to twenty inches apart in the rows. Do the thinning when the plants are from two to three inches high.

Cultivation. As soon as the plants appear, run a hand wheel hoe so as to cultivate as close as possible along each side of the row; this may have to be done two or three times before the plants are high enough for the horse cultivator. The horse cultivation may at first be close and deep, but as the plants grow up it is necessary to cultivate shallow and further away from the plants, as the roots run wide and deep. Keep the horse cultivator going at intervals during the summer, so as to allow no weeds to grow and to conserve the moisture in the soil.

Harvesting. A common corn hook has been found most useful. Drive a horse and cart along side of the rows. The driver stands in the cart and cuts the heads off as he passes along and drops them in the cart. He must then get out of the cart and cut the stalks and throw them in convenient small piles to be burnt when dry enough, for the advantage of the ashes. In prairie countries the stalks may be used to advantage as fuel.

Saving the Seed. Select with care all the largest and best shaped heads. Cut the stalks off about six inches from the head and hang up, head down, in a barn or shed to dry, or stand the heads on their edges on a floor. Care must be taken in drying as they are very apt to heat and spoil.

Filling the Silo. The sunflower heads are placed on the corn as it passes through the cutting box at the rate of one ton to eight tons of corn. The corn should be cut in the glazing stage; sunflower heads fairly well ripened. In this proportion the mixture may be fed with four pounds less grain per day than the corn alone. I consider it a most advisable practice always to grow sunflowers to mix with corn for ensilage, as wherever corn can be grown sunflowers can be also; and the smallest piece of sunflower heads is eaten up greedily by the cattle. They always hunt out the sunflowers first when the feed is put before them.

Yield of sunflower heads per acre:

1892, yield per acre	7 tons,	486 lbs.
1893, " " "	3 "	295 "
1894, " " "	3 "	1,998 "
1895, " " "	5 "	1,924 "
1896, " " "	7 "	1,823 "
1897, " " "	7 "	350 "

Average yield for the six years, five tons, 1,813 pounds per acre, or nearly six tons per acre.

GROWING HORSE BEANS FOR ENSILAGE.

Soil. Beans should be grown on very heavy sandy loam or clay loam well drained.

Preparation. The land should be plowed in the autumn. Plow four to six inches deep and subsoil same as for sunflowers. A dressing of green manure should be applied during the autumn and winter. Spread and plow under in the spring. Harrow with the smoothing harrows and sow.

Seed. The imported tick beans have been found best up to this date. Sow from May 1st to 15th with the common grain drill, about fifty pounds of beans per acre, in rows three feet apart, having the beans about two to three inches apart in the rows. It may be an advantage to have the rows very much closer; experiments are in progress in this line.

Cultivation. The land may be harrowed once before the beans come up and once afterwards. Cultivate at short intervals during the summer as long as you can get through the rows.

Time to Cut. When the beans are well podded and beginning to ripen, cut with a common short bladed grass scythe and gather with forks. The beans may be drawn to the barn on the corn rack or the ordinary hay rack.

Filling the Silo. The beans are put on the cutting box and run through with the corn at the rate of two tons of beans to ten tons of corn. The growing of the English horse beans in this district has not been as succeesful as in many other parts. They have been blighted several times about July, lessening the yield per acre. Cultivating as soon as the blight is noticed appears to check the blight. When fed to the cattle the ripened parts of the bean stalks are often left in the mangers. The beans when mixed with the corn make the ensilage of a darker color.

The average returns on the Experimental Farm for the past five years have been as follows:

1893, yield per acre....................	8 tons,	927 lbs.
1894, " " "	12 "	896 "
1895, " " "	7 "	276 "
1896, " " " (very badly blighted)...	2 "	1,918 "
1897, " " " ...., ...	8 "	423 "

GROWING SUNFLOWERS.

By Jos. E. Gould, Uxbridge, Ont.

I have been asked to write a note on the method of growing sunflowers. I attempted some four years ago to put Prof. Robertson's mixture into the silo, viz., corn, sunflowers and horse beans. I succeeded with the corn and the sunflowers, but the beans were a total failure. From experience I believe the sunflower adds largely to the value of the silage. The method I adopt is one-quarter acre of sunflowers to two acres of corn. I plant one acre of corn, then a quarter of an acre of sunflowers, two acres of corn and another quarter of an acre of sunflowers. I do not plant the sunflowers in the hills with the corn. I did that once but never after. When we cut the crop for the silo we go across the whole crop, taking the corn and the heads of the sunflowers.

I am a crank on thinking the only sensible was to grow corn is to plant in hills. We mark off our field in squares forty inches each, way and plant the sunflowers in the squares the same as the corn and cultivate the same way and at the same time. It requie about two good stalks to the hill, but sunflower seed is cheap and we plant it with the corn planter and thin it out to two or three stalks to the hill. About three pounds of seed will plant an acre; enough for eight acres of corn. Plant Mammoth Russian. Some seed is sold for Mammoth Russian that is not true. Buy from a responsible dealer or you may have a failure.

I do not tell you how you are to get away with the stalks after the heads are in the silo. When you have found out tell your neighbor, but do not tell him until you are satisfied that you have the best plan. I have not got it yet.

GROWING SUNFLOWERS FOR THE SILO.

By D. M. Macpherson, Lancaster, Ont.

I have tried the growing and feeding of corn, sunflowers, and bean mixture for silage purposes, and have found it not sufficiently satisfactory to continue its production, for the following causes: Reduced production per acre of corn, increased expense of securing properly in the silo, and the results of fertility to land for future operations reduced rather than increased. So far as the immediate resultant effects from feeding were concerned, it was found to take less grain to make up a balanced daily ration, but when the reduced amount of corn product per acre is figured, the full fertility results returnable to the land comes far short of a full corn crop. This corn and sunflower mixture takes the same position as corn and grain growing combined for milk or beef production. No farmer can produce *all* the constituents of a balanced fattening or milk ration on his own farm profitably. The only part a feeder can profitably produce (or purchase) on his own farm is the 'bulk' or carbonaceous, such as corn, and the other main part of a ration can be purchased most cheaply in the open market, such as by-products or grain, peas, beans, oats and barley. By producing the greatest bulk, or carbonaceous part, of feed per acre, and purchasing in the open market that product containing the greatest amount of albuminoids for the least money, we have a combination which acquires a balanced ration at the least money, thereby enabling the farmer to produce 'animal products' at the least cost, and acquire at the same time the greatest amount of outside fertility to return to the soil in the form of stable manure for future uses. This sub-division of a balanced ration of bulk and nourishment, and acquiring each in the cheapest market, fulfills the first principles of success in farming, which is buying animal food and plant food in the cheapest market and to the greatest extent. While acquring and producing all the elements of a productive animal ration on the individual farm reduces the fertility yearly and limits to a mininum the productive capacity of a farm, this annually becomes less, when, on the contrary, it should be on the increase. For such causes, based on scientific and business calculations and proved by practical demonstrations for the past number of years, I have abandoned the growing and feeding of the mixture of corn, sunflowers, and beans, and even corn and grain.

HOW TO MAKE GOOD SILAGE.

By Jos. E. Gould, Uxbridge, Ont.

The necessity of more knowledge in growing corn in order to make good silage has been impressed upon my mind during my institute work the last two seasons. I found some farmers with silos, who had an inferior quality of silage, and one man had abundance in his silo, "because" (as he said), "the cattle would not eat the stuff." On enquiring, I found in every case that the parties had not grown the right variety of corn. In most cases they had grown the "Mammoth Southern Sweet" or "Red Cob Ensilage," and varieties that will not come to a sufficient stage of maturity to make silage.

The object of this paper is to give some instruction, which, if followed, will make good silage every time.

Preparation of the Soil. The best bed for corn is a clover sod plowed early the summer before (not more than four inches deep), followed by surface cultivation of not more than three inches. Late in the fall rib up as for turnips with double mould board plow. Draw manure out from the byers in winter and put in heaps, thirty to fifty loads in the heap. In the spring level the ridges with disc or spade harrow, spread the manure on the surface and work in with disc, spade harrow or gang plow, not more than four inches deep. Seventy-eight per cent. of the roots of the corn plant are between two and four inches of the top of the ground, and the manure should not be buried out of reach.

How to Plant. The corn is a sun plant, and does best when the sun can shine on it all day and also on the ground to warm it. If planted in rows with the drill, as soon as the corn gets up to two and a half or three feet high it shades the ground, and one row shades the other. If planted in squares (at the corners) the sun has a chance to get at some part of the hill all day long, and also to the ground. In my opinion, therefore, if planted in squares forty to forty-four inches each way, the best results will be obtained. Plant as soon as the ground is in condition to germinate the seed, as early as the 15th of May. *Don't plant* until the ground is ready, if you have to wait until the first of June. Don't be afraid of the spring frost as it will not materially injure the plant. There should be four stalks to the hill.

The Kind of Seed. This is the most difficult problem of the whole subject. It is impossible to name any variety suitable for the whole Province. Corn that would grow a large bulk and would mature in the southern part would entirely fail in the northern row of counties, from Bruce to Ottawa. It is absolutely necessary that a variety should be planted that will mature sufficiently to be glazed before the September frost comes (usually from the 10th to the 15th). In the northern counties "Compton's Early," "Angel of Midnight," "Early Butler," and "King Philip" are sure. Some places Mammoth Cuban and Leaming succeed very well. I plant Compton's Early because I can get a greater yield of crops in proportion to stalk, making a more valuable food per ton. Other parts of the Province may plant varieties that will give a larger yield per acre, depending on the climate.

After Cultivation. This is a most important subject. Two or three times going over will kill all the weeds. We don't want to stop then. The great object is to keep the soil in condition to prevent evaporation. If the soil is cultivated not more than two inches deep a mulch is formed on the top of the ground that arrests the moisture that is continually being drawn up from below by the rays of the sun, and the plant absorbs it. Hence the necessity of stirring the ground frequently. The best plan is to start the cultivator after noon. If started in the morning early the surface is much cooler than later on, and this cool surface being turned under will keep the ground cooler than the ground would be if left alone until say one o'clock ; whereas after noon the surface of the ground is warmer than the ground is underneath, and if turned down has a tendency to make the whole warmer.

The following of these hints (with varieties to suit different soils) will insure a good crop of good sileage, if care is taken to put the corn in the silo when at the glazed period, that is, when the best ears are ripe.

FODDER CORN AND THE SILO.

By Jacob Bray, Listowel, Ont.

Corn is becoming more and more popular as a cattle food, and I think properly so. I do not know of any other plant that will give as good returns in food value ; in fact I would not know how to get along without it. We have been growing it for twenty-four years, and think more highly of it now than before. We have tried a number of varieties and have known of more being tried, but we have not found any variety that pleases us so well as the White Flint. I do not know of any plant that varies so much in its varieties as the corn plant does in its habits of growth, time of maturing, and quality, and these are all very important points to consider. Our *season* in this locality calls for a plant that will mature in the shortest possible time, and for good results we want a plant rich in food value and palatable. In the White Flint variety we have these qualities combined with a fair amount of weight.

PREPARATION OF THE SOIL. The corn plant requires a warm soil with a reasonable amount of moisture, with plenty of sunshine and a supply of available plant food, to do its best. Now it is the farmer's business to provide these as far as in his power. If the land is cold and wet we must drain it; if it is poor, we must supply plant food. In our experience we have found nothing as good as sod field for corn. Our practice has been to put manure on the sod in the fall and early winter, finishing the manure in the spring as we were able to do it, and putting on what we thought we could afford—anywhere from twelve to twenty loads per acre—and we find the corn responds to the food supplied. Then about the middle of May we plow our sod, using a wide plow with skimmer attached, turning under the manure and the young growth of grass, and if the furrows do not close well, we go over the field with the roller. When this is done we work up a nice seed bed with the disc harrow—and roller if needed—and also the drag harrow. When we have a mellow seed bed from 3 to 4 inches in depth, we leave the field roller ready for seeding.

SOWING. For some time we have planted our corn in check rows three feet apart each way, and we prefer this system for two reasons; we can do nearly all the work with the horse hoe, working it both ways, leaving but a small portion of it to be done with the hand hoe. The second reason is that the plant has a better chance for sun and air, maturing better and making more grain. In regard to the proper time to plant, no permanent date can be set; we must be guided by circumstances. The season has a very great deal to do with this; must get the conditions for growth and then put in the seed. About the time the apple blossom is coming out is a very good time to plant corn. In planting we are very careful not to leave any odd grains of corn about the field or headlands to be seen by the crows or blackbirds as we think this tends to entice them about. One bushel of seed will plant about three acres. If you prefer to sow with the seed drill stop all the seed spouts but two, if it is a ten hoed drill, leaving the third one from each end open for sowing; also leave the outside hoes on to mark for wheel on the returns, running the wheel in the outside hoe mark the same as if sowing other grain. Your corn will then be at an equal distance and there will be nearly three feet between drills. Set your indicator to sow twelve pecks on the large pea scale, and you will be sowing about one-half bushel of corn to the acre, which is quite accurate enough, and if the seed is good, less would give better results.

CULTIVATING. We harrow the ground several times before the corn comes up, using a light harrow with teeth made of six inch wire nails. There are six rows of teeth in the harrow, four inches apart in the row; the harrow is triangular with two rows of teeth on each side. In using we hitch on to one side and let the point come behind—just the reverse of the old A drag. We use this harrow until the plants are large enough to be cultivated with the horse hoe, going over the ground as often as we think is necessary to clean the ground and to keep a mellow surface, and we consider this implement has been a satisfactory investment. Our implement men are offering a more costly tool for this purpose and one that does good work; it is just a question of dollars or cents in this case. When cultivating for the first time we aim to go down a good depth, we find a "Planet Junior" a good tool for this work, as you have splendid control of the depth—a matter of vital importance. The second cultivation should be shallow, merely to keep the surface free from weed growth and mellow, going through as often as is necessary to accomplish this.

HARVESTING. We have found that the riper we can get the corn before putting in the silo the better we like it when it is taken out. Last year we had some experience with frozen corn—our first since we built a silo—and we do not fear a frost nearly as much as we formerly did, as the frozen corn came out apparently in good condition, and we feel that we would risk some frost rather than to cut too green. We have always cut our corn with the sickle, and so long as we can get men at a reasonable rate we think it will pay to do so. Four men will cut and load three acres of corn in a day. We have been paying seventy-five cents per day for this work, and we think this is cheaper than it is being done with the harvester.

We prefer steam power for driving the cutter, as it is very steady and we think cheaper than horse power. We always keep a good reliable man in the silo when we are filling, to keep the corn evenly mixed and spread, and to tramp it firmly in every part, especially the corners. To assist in mixing we place something in front of the carriers to catch the corn and let it drop straight down. In this way we get it very nearly right, while if it is allowed to fly from the carriers, the heavy part will go to one side of the pile and the light to the other side. We prefer to put in the corn continuously until the silo is full, then to wait three or four days and fill up again and afterwards to put on a few pails of water and tramp thoroughly each day for a week. The corn will then form as good a covering as is required, and we think cheaper than anything we could get on, the waste will not be more than from two to three inches deep over the surface of the silo. It is best to allow the silage to settle for a time, say a month or more, before commencing to feed, although we have fed right along from the time we quit filling. The cattle eat it all right, but we found as we got down to where it was properly cured it was much better. This winter we are cutting hay and straw and mixing it with the silage, a meal ahead, letting it get a little warm before feeding, and so far we are well pleased with the result, feeding meal with it to the milking cows only, the dry cattle doing very well without any other grain than the corn in the silage.

SUMMER FEED. You will be pleased with the result if you save a quantity of silage to feed when the pasture fails, say in July and August, and up to the time the corn is ready to put in the silo. We have done so for years now, and we get better return from this method of feeding than from any other we have tried. The cows are very fond of it, and are doing well, and it is always inside and ready ; no hunting for feed in a storm.

THE SILO. The silo may be constructed of different forms and of any material that will combine strength with a texture sufficiently close to exclude air. We think the circular form is the ideal one for ease in packing and preserving qualities, there being no corners in it to require special care in filling, every side presents equal conditions for setting and pressure. There may be circumstances when it will be advisable to make what is commonly called the square silo, to fit a certain part of a building or to save space. Then I would say, go ahead, build your silo square or oblong to suit the corners. Be particular in filling the corners when putting in the corn, and you will be safe. There are two things to bear in mind when constructing a silo. The silo must be as nearly air tight as possible, and there must be sufficient pressure on the silage to drive out and exclude the air from the cut corn. Right here let me ask you to think of the condition of the corn as it is dropped into the silo and spread about. It is fresh and green, every part with a straight cut edge, and pack as you will there is a very large part of the space occupied with air, something we must get rid of before we can preserve our corn. How are we to do it? We supply the conditions and nature's law does the rest. The necessary conditions are pressure—continuous pressure; the very air that permeates the freshly cut corn assists in its own expulsion by uniting with the elements of the corn and starting a chemical action which causes heat, and the air being expanded is forced out. At the same time the corn is softened so that it settles together much more closely than would be possible without this softening process, and we believe the corn is at the same time made more digestible by this process. So here the farmer is as usual working hand in hand with nature, making use of nature's law to accomplish the purpose he has in view. Now we must have our pressure ready to act constantly, forcing down and closer together those particles of corn and when this is done our silage cools down, and as long as those conditions are maintained our silage is soft. We now see the necessity, of pressure and the modern way to get it is to build a deep silo and fill it to the top, and when we say a deep silo we mean not less than twenty-five feet and up to thirty-five feet. Our own silo is twenty-eight feet deep, and is giving good results. I don't think a silo less than twenty-five feet in depth would be satisfactory.

MATERIAL. In our section our silos are all of wood, hemlock pretty much if not all. There are one or two plastered on the inside with waterlime that are doing well as far as I have heard, the rest are of wood entirely. We have not yet got into the cement stage, although I presume we will by-and-by, for I feel sure we cannot do without silage, and wood will not endure forever—especially hemlock. But, I would say if you are able to use cement, by all means build a concrete silo and I am satisfied, if properly constructed, you will have a practically indestructable building; but if not, build a silo anyway, no matter how or of what material, only let it be air-tight and strong, with sufficient depth to give a good pressure, and you will find ways and means to get another when it is done. Our own has been filled five times and is apparently in good condition yet. It is made of double inch hemlock dressed to equal thickness, with double tar paper between; size about 13x15 feet inside and twenty-eight feet in depth. The lumber stands on end, in fact it is a square tub silo with hoops of wood, 2x10 inch hemlock, placed about twenty inches apart, it being the first of that design I know of. The floor is of earth. We tarred the bottom end of the lumber all round for about two feet before we put it together, letting it into the earth about two inches. Then we used cement all round the bottom, letting it come up on the lumber about three inches and along the bottom or floor about twelve inches, covering this with earth, raising the outside of the floor all around a little higher than the centre, our object being to make an air-tight corner as well as a protection against rats working under the silo, and so far it has been all right. The silo occupies part of the root house, so that it has a stone wall on three sides, and we let the lumber run down the wall with inch lumber for girts or battens against the wall, depending on the wall to stand the side pressure, which it has done so far without *serious* damage, but I find the walls on two sides are springing enough to be noticed if it is carefully looked for, and before filling again I will have them strengthened.

CULTIVATION FOR CORN AND FIELD ROOTS.

BY SIMPSON RENNIE, MILLIKEN, ONT.

I need scarcely say that any person engaged in farming should follow some system of rotation, and, in that rotation, one year should be in green or hoed crops. Now, it would be difficult for me to say what rotation would suit every part of the Province. Nor can I say what crop should be followed by corn and roots; but this I can say, there is nothing like a well rotted soil for corn or roots, especially a clover sod. But in my system of rotation I take peas, wheat and oats after sod, so that I follow with corn and roots after a crop of oats, when the land is in the poorest condition. My reasons for this are twofold, first, because after sod the land is in good condition to grow at least two crops of grain. Again, I like to apply the manure to the land intended for hoed crops, so that if there should be any foul seeds in the manure the cultivation the corn and roots require would destroy them.

Preparation of the land for Corn and Roots. After harvest, any manure on hand is applied to the oat land at the rate of about fifteen or sixteen good loads to the acre, and plowed in lightly. The remainder of the land for hoed crop is plowed fairly deep. Of late years we have hauled out some manure during the winter and spread it on the land broadcast, and find the result very satisfactory. The land intended for corn, carrots or mangels (which include beets of all kinds), should be manured during the fall or winter, and, if the manure is not too long, I find the best results are obtained by working the land in the spring without plowing, especially on clay soil. Now, this can be done with the disc or spring-tooth cultivator as soon as the land is dry enough in the spring to work finely. After the soil is well pulverized, say the first week in May, sowing may be done. Carrots or mangels would do earlier and corn somewhat later.

Cultivation for Corn. Where any quantity is grown for the grain it is better to mark off the land about forty-two inches each way and plant with a corn planter; try to have only three stalks in each hill. Probably for fodder it is as well to have four or five. After the corn has been planted a few days, and before it is through the ground, harrow well, but do not let the horses walk where the corn has been planted. Usually, it is well to harrow again after the corn is up a few inches, but I have seen cases where it would not do on account of the soil being too loose, and again I have seen the land so lumpy that the lumps would roll on top of the young plants and bury them. However, when this difficulty is met with, just start the horse-hoe or scuffler and scuffle both ways and within a few inches of the plants, but always run the scuffler shallower on the side next the rows of corn. A wrong idea some have is that the corn should have shallow cultivation, especially after it is a few feet high. Now this is a mistake. Corn requires a loose soil, and for that reason I cultivate at least four inches deep between the rows, especially after every heavy rain, until the corn is nearly full grown. It is true some of the fine fibres are broken off by the deep cultivation, but any injury by the breaking off of a few rootlets is not at all to be compared to the benefits derived from a free circulation of air down through the soil. By the loosening of the soil even in dry weather the moisture is retained, which is very important, not only for the growth of corn, but also for all field roots. It is better to use a short whiffletree eighteen inches long, after the corn gets up high, and it may also be found necessary to have the horse muzzled.

Cultivation for Carrots and Mangels. As already stated, I prefer the manure applied in the fall and winter, and in the spring to work the land so that the manure will be well mixed with the soil. Then make the drills thirty inches wide, but not high, and sown on top at the rate of about one and a half pounds of carrot and four pounds of mangel seed to the acre. After sowing, if the land is dry, roll with the common land roller and the seed will germinate much more evenly. I may say that last year, for the first time, I grew some mangels and sugar beets of the different varieties on the checkered row system, and found it very satisfactory. To do this mark the land off twenty-eight inches each way and plant with a corn planter, and single out to one plant in each place. The advantage of being able to scuffle both ways is certainly very great, especially on weedy land. As soon as the plants are seen along the rows start the scuffler at once; for at no time are the weeds so easily killed as in the early stages of their growth. Where the land is weedy it may be as well to side-hoe the carrot rows, but if the mangel rows are closely scuffled they will do until they are large enough to single. Carrots are as well to be singled out eight or ten inches in the rows. The yield will be about the same as though they were closer, but the labor of thinning and handling is very much lessened where they are left a good distance apart. In singling where the rows are thirty inches apart, mangels, especially the long varieties, should be singled out to at least twenty-four inches, and the globe varieties eighteen to twenty inches.

As soon as the carrots, mangels and corn are planted, we turn our attention to the manuring of the potato and turnip land. The manure is plowed in with not too deep a furrow as soon as it is hauled out, after which the land is harrowed and rolled, and allowed to remain at least two weeks. It is then cultivated, and worked until the manure is thoroughly mixed with the soil. For potatoes I mark out four or five rows with a narrow bottomed plow. I do not like to mark out with the drill plow, as the long sole has the tendency to pack the soil, which should not be, and when a few rows are planted I cover, going the one way with a good deep furrow and open out coming back; this should not be over five inches deep. This will always leave a few rows ready for the planters.

In my experience of potato culture the best results are obtained from planting potatoes of good size, uniform shape, and cutting to one or two eyes in a set, and, if the land is well manured, planting eighteen or twenty inches apart in the rows. A few days after the potatoes are planted, and before they show through the ground, the drills should be harrowed lengthwise until they are nearly level, and as soon as the potatoes are through the ground start the scuffler and keep the soil loose. There may be a little earth put up to the plants with the scuffler while loosening the soil, but they should never be banked up with a plow, for where this is done it tends to shed off the water between the rows, just where it is the least required.

Turnips require a nice, rich, loamy soil, so it is very important to have the land well worked and made fine so that the manure will be thoroughly incorporated with the soil, after which roll the ground all smooth. At this time, if there should come a nice shower, start and drill up about thirty inches wide, but do not have the drills high. Some are sown on the level, but I prefer the drills slightly raised so that the water will not settle around the plants in case of a heavy rain. The seed may be sown with the turnip drill at the rate of two pounds to the acre, although less would do if there were no flies to trouble the young plants. If the land is dry when sown, it is well to roll with the common land roller, and as soon as the plants commence to show along the rows start the scuffler and keep the land loose between the rows until the tops meet in the drills. Turnips should be thinned out to eighteen or twenty inches. The cost of thinning and harvesting will be very much less, and the yield will be nearly the same as if left closer.

I feel as though I cannot close this article without drawing the attention of root-growers to the importance of deep cultivation for the best results. I may say that the roots awarded first prize and silver medal at the Industrial last year received deep cultivation until some two weeks before the Exhibition.

MAKING, SAVING AND APPLYING STABLE MANURE.

By M. Richardson, Caledonia, Ont.

Until recently, our farms being stored with the fertility of ages, we have had less occasion to concern ourselves with the saving and applying of manures. In fact, many farmers seemed to think the natural fertility of their lands inexhaustible; but the time has come when most of our farms show signs of exhaustion, and farmers are now looking around for substances and methods of restoring the productiveness of their lands. What I may say is based upon my experience and observations. I am not a scientist, but a plain farmer trying to keep to the front in agricultural pursuits.

Value of Stable Manure. First, as to making manure. Chemists and expert experimenters tell us that the three essential ingredients of plant food are nitrogen, phosphoric acid and potash (besides some less essential substances) These substances are what we buy, in one form or another, under the name of chemical fertilizers. Stable manure contains all the ingredients necessary to plant life, as much as milk contains all the food elements of animal life. Now the question, is to ascertain if we can, how to produce a stable manure that will contain the greatest amount of the substances that enter so largely into the elements of plant growth. Chemists also tell us that some products of agriculture contain more of the elements above alluded to than others, and have given us tables showing their value as food for our animals, and also the value of the manure made by feeding such substances. Feed makes manure. If we feed our animals such things as are low in the essential element, we will have a manure essentially low in the desired elements of plant food. The manure made from animals fed on straw alone is barely worth the handling. The manure made from fattened steers, from yards where hogs and sheep have been fattened, and where dairy cows are kept as they should be, is worth many times as much as manure from animals fed on straw. Why? Because the ingredients fed them, such as clover hay, ensilage, oilcake, bran, etc., are many times richer in elements of plant food than manure made from animals fed on straw. Referring to a reliable table, I find that the comparative value of manure made from the different feed fed to animals is as follows:

Manure made from feeding one ton of potatoes is worth 41c., turnips 47c., mangels 45c., beets 56c., carrots 47c., whey 36c., buttermilk 56c., whole milk 96c., wheat straw

70c., ensilage 75c., corn fodder 52c., oat straw 75c., timothy hay $2.50, red clover $4 00, alsike $4.75, Lucerne $4.25, cornmeal $2.36, peameal $5.40, wheat shorts $3.80, wheat bran $6.00, oil meal $10.00.

You can see from these figures that stable manure is rich or poor according to the food fed to the animals. You will also see that clover hay is worth nearly twice as much as timothy, and peas are worth more than any other coarse grain. I keep enough stock to consume all coarse grains and fodders raised on the farm, with from ten to twenty tons of feed bought. My aim is to give back as far as possible the products of the soil in the shape of manure, to keep up the fertility of the land, and to place upon the markets finished products in the shape of beef, pork, mutton, cheese, etc. If I sell one ton of cheese at, say, 9c. per lb, I would receive $180 00. How much fertility have I sold off my farm? Say it took about ten tons of milk to make one ton of cheese. If 96c. is the value of one ton of milk, $9.60 would be the value of ten tons of milk. If the whey be returned to the farm (value $3 50) the net amount of fertility sold would be $6.10. Now, suppose I sold clover hay, it would take thirty tons at $6.00 per ton to bring me $180 00. If clover hay when fed to animals is worth $4 00 per ton for fertilizing or plant food purposes, I will have sold $120.00 worth of fertility from my farm. I sell nearly twenty times as much plant food by selling clover hay as by selling the same value in cheese. I consider it very bad policy for farmers to sell fodders and coarse grains instead of feeding them on the farm. It appears to me that farmers following such a course are not selling their farms by the inch but by the acre, and selling themselves cheap, also.

Saving Manure With many farmers little or no pains are taken to care for the accumulations around the barns and outhouses It is surprising what a large percentage of the most valuable elements of our barnyard manures annually go to waste through careless and improper treatment. There are a number of farmers who either make a practice of keeping their manure under cover or of building it up in nice, tidy, square heaps until it is used on the land. As far as possible I have all stable floors and gutters watertight. Absorb as much as possible all liquids and mix with solids. Drains should be made from all gutters to conduct surplus liquids to the manure pile in the shed The manure under cover is in good condition to apply to the soil at all seasons of the year. We practice drawing at all suitable and convenient times, from the 1st of September to the 1st of March, and top dress by spreading directly from the wagon or sleigh. From the 1st of March we generally allow the manure to accumulate to be applied to corn and root ground. The value of manure in always estimated upon the basis of commercial value. It has been estimated from careful analysis that a ton of ordinary fresh barnyard manure (horse, cattle and hog manures mixed), when mixed with straw used as litter, contains:

Nitrogen, 9 lbs. at 15c. lb	$1 35
Phosphoric acid, 4¼ lbs. at 8c. lb	34
Potash, 10½ lbs. at 5c. lb	52
	$2 21

The value of manure of different animals differs very much, and the fresh urine is much more valuable than the fresh solid excrements. From careful analysis obtained from the work, "Science in Farming," the manure is worth:

	Solids.		Urine.	
From horses	$1.36	per ton.	$8.62	per ton.
" cattle	86	"	3.14	"
" sheep	1.59	"	11.31	"
" swine	1.79	"	3.06	"

Thus we see that one of the first necessities in the care of manure is to have tight stable floors so that all the liquids can be soaked up with the solids rather than be allowed to drop under the stable and thus be lost. Prof. Roberts, of Cornell University, has found that horse manure piled up alone for four or five months loses half of its value, and cow manure loses forty per cent. I am thoroughly convinced that the way to get the largest profit out of manure is to store it in a shed, and when drawn out to the field to spread it judiciously on the land. I believe that no fixed or arbitrary rules of farming can be adopted that will be applicable to every farmer's condition, but a few general principles may apply. One of the charms and advantages of agriculture is that a farmer must think for himself. He should study principles, and apply them in practice as best suits his circumstances. I am satisfied that the farmer who fertilizes his brain the most with the knowledge of his business, fertilizes his fields the best.

MANURES AND MANURING.

By T. H. Mason, Straffordville, Ont.

The question of the conservation of soil fertility, in this country, is rapidly becoming a very important one. In the early history of the country it was not thought so important, the soil then containing, practically intact, all the stores of fertility that had beon accumulated for ages. For a long period after settlement, the condition under which our farmers labored necessitated the sale of potash salts and the various cereals. This fact, coupled with the wasteful system of managing farmyard manure, has, in many sections of Ontario, led to to a great reduction in the fertility, and a corresponding reduction in the profits of the farmer. Manures may be divided into three classes, commercial, animal, and vegetable. Under the first heading are found all those compounds that are manufactured from various sources. They are especially useful in fruit growing and market-gardening sections where it is not practical to obtain other manures. For the general farmer under present conditions, I do not think that their application will prove profitable. Animal manure or perhaps better, farmyard manure, is the excrement of the various classes of farm animals mixed with the straw and other waste of the farm ; it varies in richness with the age and class of stock fed, and also in the richness of the food used. The manure from young animals and milch cows is not nearly so rich as that from older fattening animals. The young animals have to take from the food the materials necessary for bony structure, hair and muscles, and these materials are rich in phosphates and other mineral matters that are not usually any too abundant in Ontario soils. The cheapest way to counteract the drain made upon the soil in these constituents, is to purchase and feed on the farm, bran, oil meal, cotton seed meal, and other foods, using, of course common sense in the selection according to market prices, class of stock to be fed, etc.

Vegetable or green manure is valuable in many sections, especially to many farms. Where soils are naturally deficient in humus or vegetable matter, or where the humus has been exhausted by a long course of severe cropping, and where, owing to the distance from the buildings, it would be expensive to draw farmyard manure, this class of manure is especially valuable. Many plans are adopted. The sowing of rye in the fall and plowing down the following summer ; sowing buckwheat on a fallow, or turnips or rape as a catch crop after fall wheat or barley. The most valuable plants for plowing under are those belonging to the order Leguminosae, such as clovers, peas, or beans. This order has the power of making use of the free nitrogen of the air and storing it for use in the structures of the plant. As nitrates are among the most expensive as well as important elements in manures, a knowledge of this fact is highly important in keeping up the fertility of the soil. By green manuring it is quite possible to keep up the stores of nitrogen and humus in the soil, but a long continued course of this treatment would eventually necessitate the supplying of phosphates and potash in the form either of commercial fertilizers or farmyard manure. One of the best ways of green manuring is to sow some variety of clover, common red or mammoth, with every grain crop, and then turn it under, either late in the fall or the following spring. This plan would work well where a corn or root crop followed a grain crop.

Farmyard manure is the most important to the average Ontario farmer, and a great deal of the value of this manure depends upon the way in which it is treated. Perhaps in a majority of cases the manure is thrown out and exposed to the action of rain, sun and atmosphere for months. There is a continual deterioration in the value, and a great reduction in the bulk of the manure handled in this way. Many agricultural authorities estimate that there is a loss of fully one-half in the fertilizing value By an experiment held at the Ottawa Experimental Farm a few years ago, it was proven that a manure heap, exposed in the usual manner for six months, lost over one-half in weight, while by a series of experiments at the same institution, extending over a period of nine years, it was proven that an equal weight of farmyard manure (fresh) and of well rotted manure applied to all the principal farm crops gave practically equal results, the slight difference being in favor of the fresh manure. Hence it follows that the practice commonly followed leads to a very serious loss. Many of our best farmers are now drawing the manure from the stables to the field and spreading it on the land; this, of course, on lands not subject to overflow. This practise has several advantages: The work is done in a season of comparative leisure when labor is less valuable; there is practically no loss of fertilizing constituents as there is no fermentation, and the drainage is absorbed by the soil.

NOXIOUS WEEDS AND METHODS OF DESTROYING THEM.

By Wm. Fairweather, Alma, Ont.

Ever since the efforts of man to provide for his subsistence was directed towards the cultivation of the soil—from which has developed in the course of time the science of Agriculture—he has been confronted by the difficulties which noxious weeds and plants present, preventing him from getting the best possible returns for the care and labor that he has expended in his endeavors towards that object. From the time of the sentence, "That in the sweat of thy brow shalt thou eat bread," and "Thorns and briers shall the earth bring forth to thee," up to the present, the contest has been going on, and is likely to do so, up to the end of time. I suppose that it is a settled conviction with most that it is hopeless to expect a complete eradication of the most inveterate kinds of weeds that we now have; and we are continually hearing and reading of kinds new to us, which are said to be worse than any that we were before acquainted with; and it is often predicted that if such and such a foe once gains a foothold farewell to any hope of ejection; but such fears are usually without much foundation; and when the necessity arises means will be found to successfully combat them. Some time since a circular was issued by the Department of Agriculture for the purpose of collecting information respecting the distribution of different kinds of weeds in the Province of Ontario; asking each correspondent to name the ten worst weeds in his locality, but of 1,015 replies every one mentioned the Canada thistle; about two-thirds of the number wild mustard; then in decreasing proportions wild oat, ox-eye daisy, burdock, couch grass, rag-weed and many others; a few mentioning wild flax, sow thistle, and bindweed, which are only just beginning to attract attention in this neighborhood, although nearly every one of those mentioned may be found in the adjoining townships; I have found it to be both interesting and useful to be able to recognize them either by the growing plant or by the seed.

In order that we may be able to proceed intelligently in our efforts towards the destruction of weeds it is advisable to study their habits of growth, modes of propagation and distribution, and duration of their existence.

As to their duration, weeds are classed as annuals, biennials, and perennials. Annuals complete their term in a single season—that is, the plant ripens its seeds and then dies inside of a year. Thus if annuals are prevented ripening their seeds on any farm from year to year, the time will come when they will become extinct for want of seed; but many of these seeds, being of an oily nature, remain for many years under ground until at last they are placed in a favorable position for growth. It is sometimes necessary to drop certain crops out of the rotation in trying to destroy certain kinds of weed ; some ripen their seeds early in the season, others later, and if the plants are too numerous to be hand-pulled, or otherwise prevented ripening their seeds, it is useless to expect to overcome them ; for example, the wild oat, mustard, and others, will not only ripen but also scatter their seeds in any of the cereal crops, except perhaps fall wheat and barley. In very dirty fields it is a good plan to lightly cultivate the surface of the ground after harvest, which in a favorable season will cause many of the seeds to grow. Then deeper plowing before winter sets in will bring to the surface another layer of seeds which should have an opportunity to grow in the spring before working up the ground for a crop of corn, roots, or rape, or perhaps all of them ; so that in the course of the season, by repeated stirring of the surface soil, most of the seeds will have germinated, and been destroyed, thus making it possible to hand pull any plants that may appear in the succeeding grain crop, which should be sown, and put to grass or clover without being deeply plowed. This will have brought to the surface another layer of seeds. Then leave the land in grass for two or three years. Plow deeply in July or August, bringing up more of the seeds lying buried in the ground, then surface cultivation, followed by corn, roots, etc., the same as before.

Then that class called biennials, which require two seasons in which to complete their growth. During the first season they grow a mass of foliage often with a strong tap root, like the burdocks and Scotch thistle ; in this is stored a supply of nourishment with which to perfect the seed the following season. This class of weeds is not difficult to destroy, and is seldom or never seen in well cultivated fields, but is very common in fence corners and pieces of waste lands.

But it is with the perennial species of weeds that the greatest trouble is experienced, those which live from year to year, some being propagated by seeds only, others by both seeds and roots. Of this class there are very many varieties, some of them very tenacious of life indeed. Of the more common ones I may mention the Canada and perennial sow thistle, the latter, not so prevalent as yet but a most pestilent weed, and couch grass known to most of you, and the ox-eye daisy, and bindweed. The roots of most of these are supplied with joints which, as they extend through the soil and are carried from place to place by cultivation, immediately send out a fresh stalk and become a new plant, besides perfecting and scattering their seeds at every opportunity.

In fields very dirty with these weeds I think that it is best and cheapest to subject the land to a bare fallow. I know that there are very many opponents to this plan, but in the end I believe it pays, if it is properly done and not in the way I have sometimes seen it attempted, thereby not only losing the crop which might have grown but by leaving the weeds in entire possession of the soil giving them added strength and vigor. Plow the land deeply in the fall to expose the lower roots as much as possible, and as early in the spring as they begin to show any signs of life lightly plow or cultivate the soil, keeping this up throughout the growing season, the roots of the plants will be smothered, and a great proportion of the seeds in the ground will have germinated and been destroyed while young, for it is no more difficult to destroy a young weed plant than a young clover plant in the first two weeks of its existence.

With couch grass when very bad, if the weather is dry—and dry weather is absolutely necessary in dealing with this weed—it is a good plan to rake off the greater portion of the roots, and burn them or dispose of them in some way that they will not again get a chance to take root.

In closing I wish to say a word respecting the sow thistle. It is not very generally distributed as yet, but I would advise every one to make himself familiar with the plant, its bright yellow flowers being very noticeable in the grain fields, and if found just gaining a foothold, to destroy it root and branch, the sooner the easier. I know of no weed that takes such entire possession of the ground, absolutely smothering out every vestige of the growing crop of grain in the thicker part or centre of the bed ; and as it spreads very quickly I know of no reason why it will not soon take the whole field.

Another new weed, a variety of the convolvulus, of which the morning glory is a species, called the bindweed. I have seen several specimens of it; it is said to be very difficult to kill, but I do not know much about it or of its capabilities for evil, but it will be well to be on our guard against it. Some specimens on the lawn of the O. A. C. which had boen kept from seeding for years were hoed almost daily during the season of 1896, after which treatment, as soon as opportunity offered, a large number of plants appeared above ground. Some farmers declare it can not be killed, but to those of you whose farms are in a fairly clean state, keeping the land in a good fertile condition, a judicious system of cropping on a well drained subsoil, and also sowing the cleanest seed obtainable, thereby insuring abundant returns, is the surest way of keeping down noxious weeds.

WEEDS ON THE FARM.

By H. Glendinning, Manilla, Ont.

It has been said that weeds on the farm are a blessing in disguise. There may be a good deal of truth in this saying, as weeds have compelled farmers to cultivate the soil so as to eradicate them, and this cultivation has benefitted the crops that were sown or planted on the land. But I have yet to meet the man that is looking for this blessing. As a rule, weeds are of no value for food for either man or beast, being acrid and bitter. They rob useful plants of their due share of nutriment as they feed upon the same plant food that our grasses, grain and root crops do. They will gather nourishment from the soil more readily on account of the majority of them being possessed of strong roots and a vigorous constitution. They destroy useful plants by crowding and shading, making the crop more bulky to handle and thresh. Hoe crops, because of them, are much more difficult to clean and if let grow, difficult to harvest. The longer weeds are allowed to grow, unchecked, the greater the labor required to subdue them To successfully combat weeds with the least possible amount of labor (the average Canadian farmer has not too much help during the busy season) it is necessary that he should make a careful study of the habits and growth of the various sorts of weeds and their mode of distribution Seed grain, clover and grass seed, live stock purchased, feed stuffs, farmyard manure, road and farm vehicles, implements of tillage, threshing machines, railways, birds, wild animals, waters, winds and the inherent power of some weeds through their creeping roots, all contribute to the spread of weeds. Weeds may be divided into three classes:

1st. Annuals, which consist of those plants that spring into life from the seed in the spring of the year and mature the same season and the parent plant dies, such as wild mustard; or those that the seed starts to grow in the fall and matures its seed early the next season, of which the fall cockle and pigeon weed are examples. It follows, then, that weeds of this class produce only one crop of seed, and if means are annually taken to prevent the seed from ripening, the time must come when those weeds will be eradicated from the land. In fact, the weeds would all be destroyed in a single season if it was not that many of the seeds are encased in an oily covering which gives them the power to resist decay in the soil for years, so that their vitality is unimpaired, and they will spring into life as soon as they are brought sufficiently near the surface to be influenced by the sun and air; as an example of this we have the wild mustard.

2nd. Biennials are those weeds that require two years to complete their growth and produce seed—as an example, the burdock The majority of them have a strong tap root, growing deep into the soil. During the first year the plant stores up large quantities of starch in this root, which is utilized the second year in producing seed. As this class of weeds is only reproductive from seed, it follows that any cultivation that will prevent them maturing their seed will be effective; but this is not always easy, as they often take possession of fence corners, and places where the plow and other implements of ordinary cultivation do not reach. Although plants of this class may be cut off close to the ground several times with a scythe or other tool, yet they will persist in producing seed. One way will always be found effective, that is, to cut the tap root off below the crown, say three inches, with a sharp spade or spud.

3rd. Perennials ; these weeds live and produce seed for an indefinite number of years. They are of two classes. The ordinary perennial has a simple root and reproduces itself from seed only, as the ox eye daisy. The creeping perennial not only reproduces itself from seed but multiplies by means of its creeping root stalks, which run along beneath the surface of the ground in various directions from the parent plant. The Canada thistle and the couch grass are examples of this class of weeds. These roots contain a large number of latent buds, and whenever the soil is stirred in moist weather they spring into life. If a root is broken or cut during a warm, moist time, each of those roots will send out a new plant, hence it follows, that during such times land infested with those weeds should not be worked. Hoe crops and summer fallowing that is improperly done is more likely to increase than destroy the weeds. The cultivation should be done when the weather is dry and warm, and work the land so as to bring the roots of these plants to the sun or keep them under the ground by some smother crop, such as clover or buckwheat.

By careful observation of the crops grown upon the farm it will be noticed that certain crops are conducive to the growth of certain kinds of weeds. For instance, fall wheat and rye are conducive to the growth of fall cockle, pigeon weed and chess ; spring grain to wild oats, mustard and foxtail ; meadow and pasture to curled dock, ox-eye daisy and plantain. Keeping this fact in mind, it will be readily seen that one of the best methods to destroy weeds is to follow a regular rotation of crops. By growing spring crops on land that is infested with weeds that are common amongst fall grain, the spring cultivation required for putting in the crop will destroy the majority of the weeds that commenced to grow the fall previous ; and by growing fall crops on land that is infested with weeds common to spring grain the crop is harvested before many of the weeds have had time to mature their seeds. Pasture and meadow generally destroy the annuals but are troubled with biennial and perennial weeds. The cultivation that would take place during a four years' rotation would keep those pretty effectively in check. The hoe crop that comes in during the rotation, if properly done, is the best of all crops for cleaning the land of all classes of weeds. Summerfallowing also, if properly done, is very effective but is too expensive. Few Canadian farmers can afford to let their land lie idle a year. A bare fallow is a rare sight in the older sections of the Province, its place having been taken by corn or roots. The next best crop to destroy Canada thistles, which are so common in this province, is a crop of red clover, cut about the middle of June when the thistles are coming in blossom ; then cut again for seed about the first of September. If this is followed by a crop of timothy hay the next year, it will be found that the thistles are pretty well destroyed, those that remain being very puny and weak. The best time to destroy all weeds that spring from the seed is just after they have come up. Then the root is very fine and weak ; a harrow passed over the land at that time will destroy great multitudes. Some farmers report great success by using some of the modern weeders on their spring grain where the land is infested with mustard. One farmer informed me that he had killed millions of young mustard plants without any injury to his grain.

Sheep destroy many weeds that are not touched by other stock. Shallow cultivation soon after harvest will start many of the seeds into life, which will be destroyed by the late plowing. See that the threshing machines are thoroughly cleaned before they come on the farm. Sow only clean seed grain or boil all screenings. Grind all grain that is fed to horses or other stock on the farm. Do not let the land lie idle, but keep it constantly at work or in grass Be careful about buying seed grain, clover or grass seeds, as new weeds may be introduced from countries thousands of miles away. When weeds are very prevalent on the farm it will be well to turn all the manure in the barnyard into a heap in the field so as to destroy the seeds by heating.

TREE-PLANTING ON THE FARM.

By Phillips Thompson, Toronto.

The evils which have resulted from the excessive clearing of the country in the older settled portions of Ontario are now generally recognized. The present generation of farmers have learned by costly experience the desirability of maintaining a due proportion of the soil under timber as a means, not merely of preserving the conditions favorable to agricultural fertility, but of furnishing continuous supplies of wood for fuel and other purposes, and many of them are disposed to repair, as far as may be, the mistake of the past by systematic tree-planting and preservation. There are several reasons why every farmer and rural land-owner should undertake this work. Tracts of forest, where such remain, or artificial shelter belts, act as a protection to growing crops, by preserving the moisture. They temper the violence of the wind, which in the winter season sweeps away the snow and in summer causes rapid evaporation. An abundant and perpetual supply of fuel for the cutting and other wood for fencing, repairs, etc., is a most important item in the economy of the farm, the value of which was hardly realized by many until the exhaustion of their wood lands compelled them to buy coal or bring wood from a distance.

The more valuable kinds of timber are in increasing demand for manufacturing purposes, and by planting or protecting young trees of this description the farmer is steadily adding to the value of his property and growing a crop which may prove as profitable as the yield of his fields, with considerable less trouble. In addition to the ultimate proceeds of the timber, some trees, such as the sugar maple, hickory, and chestnut, yield a yearly return which is a perceptible addition to the income of the farm. Trees planted for shade and ornament about the farm house and out-buildings, along the lanes and roadside, add to the comfort and attractiveness of the farm; give it a pleasant, cool, homelike aspect, in striking contrast to the bare, bleak look of the treeless homestead where the buildings stand exposed to the heat and storm. A consideration which should have weight with the most utilitarian of men, however indifferent they may be to tasteful and esthetic surroundings personally, is that the attractiveness and beauty of judiciously planted shade-trees will materially increase the selling value of the farm. Few purchasers would hesitate between two farms of equal productiveness and fertility, one adorned with handsome well-grown trees around the house and its approaches, and the other bare of trees. There is, somehow, a suggestion of prosperity, comfort and snugness in a home partially embowered in forest verdure which nothing else can convey in the same measure.

Management of the Wood Lot. Despite the extent to which clearing has been carried, most farmers still possess a few acres of woodland. On the judgment and care with which the wood lot is managed depends the question whether it will be exhausted in a comparatively short time or furnish a never-failing supply of fuel. Hitherto the farmer, like the lumberman, has regarded the timber as a resource to be utilized as necessity or convenience might require, once for all, instead of as a crop to be harvested at maturity while making due provision for its reproduction. To make it of permanent value the wood lot must be "farmed" in the strict sense of the word. It is just as false economy to exhaust timber-bearing land and rob it of its future productiveness, as to destroy the fertility of the field by continuous crops, without restoring by manuring and judicious rotation those elements of the soil to which it owes its richness. Too often the wood lot is allowed to lose its forest character, and the conditions of shade, soil and moisture favorable to the natural reproduction of young trees, so that as the mature timber is removed its place is not taken by a vigorous young growth, as would naturally be the case. The old trees are cut away in such numbers as to leave large, clear spaces where a thick growth of grass or weeds replaces the light, porous forest soil. The process of destruction is completed by pasturing cattle or other live-stock in the wood lot. They not only consume and trample down the young trees but stamp the ground hard. In the original forest floor, light, loose and spongy, which absorbs and retains large quantities of moisture, the seeds of the trees readily germinate and supply a thick growth of seedlings to supply the vacancies left by the axe. But where the soil is grass grown, exposed and trampled hard, the seeds which fall from such trees as remain cannot obtain the requisite nourishment and protection; while such few seedlings as may find a foothold under such unpropitious conditions are speedily destroyed by the stock. Where cattle are habitually permitted to pasture among the trees the ultimate destruction of the woodland is merely a question of time. In addition to carefully excluding the live stock from land intended to yield a permanent supply of timber, it is of vital importance to preserve the shade by avoiding too large breaks, such as would be caused by the removal of several trees in the same immediate neighborhood. The farmer should be guided in cutting mainly by the consideration of always, if possible, leaving enough large or partly grown trees in the vicinity to restore by the spreading of their branches the canopy over head. But there are other considerations to be kept in view. It would always be advisable to remove dead or decaying trees, in preference to cutting those of healthy and vigorous growth, and to thin out many places where the trees may be growing so thickly as to impede each other's development. It is desirable also to encourage the best and most valuable varieties rather than to have the space occupied by inferior kinds, so that unless the latter are obviously needed for the preservation of the leaf canopy they should be systematically weeded out, leaving room for saplings of the more desirable species to fill their places. Where the cutting has been so excessive as to leave considerable vacancies, and intermittent grass-covered spaces with no young trees springing up, replanting will be necessary. A great deal can be done towards aiding the

Pines about 23 years of age, thinned and pruned.

natural process of reproduction by which nature secures the preparation of the forest, by a little judgment and caution in cutting and removing the mature trees in such a way as to injure as little as possible the surrounding vegetation in an earlier stage of growth. By felling a tree, for instance, so that it will fall in one direction—rather than another—or making a slight detour in the wagon track in removing the wood, it may be easy to spare a group of thriving young seedlings which would otherwise have been crushed. Perhaps most farmers would consider this but a small matter, but it is precisely the spirit of heedless indifference to such small matters which is responsible for much of the evil resulting from forest destruction.

Planting of Timber. In considering what and how to plant, the first thing to be taken into account is the object in view. If the ultimate commercial value of the timber is reckoned upon rather than the desirability of shade or adornment, planting in blocks is strictly necessary. Trees set out singly or at such distances from each other as to allow the spreading of the foliage, or planted in lines as windbreaks, while they will be available for fuel will not furnish marketable timber for manufacturing purposes, owing to the branching of the limbs near the ground. It is the dense growth of the forest which furnishes tall, straight trunks. There is a constant struggle upwards for space and light, and although "there is plenty of room at the top," a very large proportion of the aspirants die in the effort to get there, being over-topped by more vigorous or fortunately placed competitors. The result of the crowding and crushing is that the survivors possess clean pruned, columnar trunks, furnishing timber of the necesary length and freedom from knots suitable for the purposes of the builder or artizan. But the period of struggle for the vantage ground of the upper air is a time of slow growth. The contestants mutually retard each other's development, and where the groups of young trees stand very thickly progress is comparatively slight, until by degrees, the few that are destined to survive, have established their ascendancy. Hence arises the popular impression as to the length of time required to raise merchantable timber. The art of the forester consists in regulating conditions so as to secure the close contact required in the earlier stages of development to obtain a straight and upward growth and afford mutual protection, and subsequenly by judicious thinning to allow the room for straight, steady expansion. By thus assisting nature and forestalling the slow crowding-out process by which the trees in the forest come to maturity, the period of growth can be very materially shortened

Mixed Plantations Best. Experience is in favor of mixed plantations rather than close confinement to one variety. Some species require more light than others and it is well to have the plantation comprise a mixture of the kinds that require light and those which will thrive in the shade. As a rule, trees of dense foliage, such as the hard maple, beech, pine, spruce and chestnut, are liable to endure the shade, while the varieties the leafage of which is comparatively thin, such as the elm, oak, walnut, ash and cedar, demand ample light in order to flourish. The shade-enduring kinds should be planted in larger numbers than the light-demanding species.

Transplanting Forest Trees. Where a small area is to be set out transplantation of seedlings from the forest may be successfully undertaken. The mistake which most people are apt to make in setting out trees is the removal of those of too large a siz , under the belief that by securing well grown saplings they could save several years in the growth of the tree. In the first place it is a loss of time and labor, as it is much easier to transplant a small tree than a large one, and secondly, the sapling, however carefully moved, usually makes little progress for some years, as all its vitality is needed to establish itself in its new location, while the smaller tree is soon domiciled and quickly resumes its growth. Moreover, it is a difficult matter to secure a forest tree of a few feet in height without tearing off much of the fine fibrous roots. It is not advisable to transplant forest trees much over a foot in height. Those taken from the edge of the woods or comparatively open spaces will stand removal better than trees growing up under a dense cover. The cause of many failures in transplantation is that too long a time is suffered to elapse before the trees are set out, during which time the roots, especially if exposed to the sun and winds, get dry and lose their vitality. If some delay is unavoidable, care should always be taken to keep the roots moist.

FARM NURSERIES. The best plans of stocking a plantation with the least difficulty and cost and the surest results is to raise the trees from seed, either on the place where they are intended to remain or in a small nursery from which they can afterwards be transplanted.

Natural, unpruned pines which did not come up thick enough.

The latter is the preferable system, as close growth in the earlier stages is necessary, and the great majority of the seedlings will in any event have to be removed from the spot where they germinate. The soil of the nursery, selected as well as that of the plantation, should be thoroughly prepared by deep plowing and pulverizing and all weeds destroyed as far as possible, stable manure being applied as for an ordinary field crop. It is of special importance to have the mould as fine and loose as may be, for it must be remembered that in the forest the seeds fall upon a light, open, porous soil with particularly favorable conditions as to shade and moisture, which are lacking in the open, and hence they are not likely to germinate successfully among hard, dry clods. The seed should be sown thickly and thinned by transplantation, as the seedlings requires more space, the final removal to the plantation being accomplished when they have attained a foot or less height. By adopting the nursery system the farmer will have his supply of young trees close at hand without the necessity of going to the woods for them, and the planting can be done at odd times when the weather is favorably damp. The work can thus be undertaken by degrees, especially if the family can be interested in it, as much of the light labor can be done by quite young children with a little supervision. Performed in this way it becomes a much less formidable matter than the transplantation of a few thousand forest trees, the time and labor involved in which is apt to deter most farmers from the attempt. It is best to sow the seeds the same season they are gathered, as, if kept over the winter, they may lose their germinating power. Planting should be done in the early spring if possible, before the trees are in leaf, and in moist or rainy weather. If, owing to the rush of other work, this is out of the question, it may be undertaken late in the fall when the sap has returned to the roots and the leaves have disappeared. The distance between trees set out in a plantation should be about four feet each way. For the first two seasons the ground between them should be kept free from weeds by the use of a cultivator. When foliage develops sufficiently to shade the soil this will no longer be necessary.

THINNING The extent to which thinning out should be practised, after the trees are well advanced and begin to crowd each other, depends so much on varieties and conditions of development that it is impossible to lay down general rules. It is a matter that must depend mainly upon individual judgment, and an important factor will of course be the farm or market requirements for fuel, and timber for other uses. The same principles as were laid down in regard to the management of the wood lot with regard to cutting out inferior varieties and decaying trees, while sparing the finer growths and those most promising as regards the value of the mature timber, will apply to the plantation. It is not unlikely that before the time for thinning out arrives many of the trees may have died. Such vacancies during the earlier stages of growth should be promptly filled by fresh planting.

SITES FOR PLANTATIONS. Farmers in determining to set out a plantation will naturally select the land that is least adapted for agricultural purposes. In very few farms is the whole of the cleared acreage under cultivation. There is generally some portion which, owing to the disadvantages of soil or situation, is left untilled, especially if the land is much broken. Hill sides, where the plow can only be used with difficulty, or sandy tracts where grain cannot be grown, which should never have been cleared of their timber, and are now merely waste land, can be made a source of ultimate profit if planted with trees. In very poor land white pine is the best tree to plant, as it will thrive where the better varieties of hardwoods would die out or barely maintain themselves. Where there is a choice of locations it is best to select a site for a plantation on the north or north-western side of the farm, as it will then form a protection against wind storms from that quarter. With the same object in view an elevated situation is better than low or level ground.

WHAT TREES TO PLANT. If the soil is at all adapted to it there is no better tree to cultivate then the hard maple, which, in addition to the value of the timber for which there is a steady and growing demand for manufacturing purposes, yields an annual return in sugar or syrup ; this farmers who are fortunate enough to possess a sugar bush will know how to appreciate. It has the further advantage of being a common tree and easily obtainable. The white ash is a rapidly-growing tree the timber of which is greatly in demand, even if cut when small.

The shell bark hickory is another tree that gives a comparatively quick return for the labor bestowed, as the young trees are marketable, and the yield of nuts is likewise a source of profit. It will not grow well, however, on poor sandy soil. Phenominally valuable among trees is the black walnut but it is many years before the timber attains the rich glossy color that renders it specially prized for cabinet-making, so that, unless the owner is willing to plant for posterity, he will naturally prefer more rapidly maturing varieties. The bass wood, if obtainable, is a desirable tree, being a fast grower and yielding timber which is much in demand for a variety of purposes. The best honey is produced from its flowers White or rock elm furnishes a quality of timber which is much sought for, but its liability to be attached by insect pests is a drawback which must not be overlooked. Another tree that should be more freely planted is the chestnut, the nuts of which are always saleable. When planted close and thinned, the cullings can be disposed of for ties and posts.

WINDBREAKS Trees planted for shade or ornament or as windbreaks will, of course, be set out at further distances apart then when grown for timber. About fifteen feet is advisable at the start with a view to subsequent thinnings to allow opportunity for expansion, so that each tree stands not less than thirty feet from its nearest neighbor. A good way to plant windbreaks is in double rows, the trees of one row being equidistant between the two nearest on the other. Hard maples and evergreens set out in this fashion make a desirable and attractive looking windbreak, the low spreading branches of the spruces or pines affording efficient protection to the near field vegetation Norway spruce is highly recommended for the purpose, but latterly the ravages of the spruce gall louse have destroyed much nursery stock of the spruce kind, so that its use can hardly be advised. If spruce is used at all, the native kind should be taken, but it will be well to make sure that the pest has not invaded the locality from which it is procured. Trees set out for shade or ornament should be considerably more advanced than those planted in blocks, as they are more liable in such situations to accidents. They should be sufficiently grown to be conspicuous, and strong enough not to be easily crushed or broken by contact. The necessity of care in the work, of seeing that the roots are as little injured as possible and given ample room in the hole instead of being simply jammed in, and the soil firmly pressed down but not stamped so violently as to break or bruise the roots, can hardly be too strongly emphasized. They should be planted in good rich earth mixed with well-rotted manure, and well watered at first if the ground is at all dry Indifference to the most obvious precautions necessary to render the shock to the vital organization of the tree by a complete change of environment as light as possible, is responsible for the great majority of failures in tree-culture. If trees are set out where many people or animals are likely to pass near them it is advisable to protect them by stout stakes or guards. Roadside planting has been a good deal in favor in some districts, where it has considerably improved the aspect of the country. It has its disadvantages, however, in the liability of the young trees to be injured or destroyed by cattle, and in the places where the roads are narrow and badly drained and the soil heavy, the shade cast by large trees keeps them from drying Planting on the boundaries between fields, around the house and barns and on rising ground to the windward, has more to recommend it. No argument can be urged in its favor more conclusive than the experience of the steadily increasing number of progressive farmers who have undertaken tree-culture on a larger or smaller scale. They are all highly satisfied with the result, and enthusiastic in their testimony as to the success which can be attained by ordinary care and judgment, and the rich returns for the comparatively slight labor and expense involved.

LUCERNE OR ALFALFA.

BY A. E. ELFORD, HOLMESVILLE, ONT.

The subject of fodder and fodder crops is a very important one. In this age of low prices for farm products, he who will succeed has to do some hard thinking. A few cents, either way, in cost of growing, or increase or decrease of pounds per acre in product, may mean his profit or loss for the whole year.

In olden times timothy was about the only fodder crop grown. Indeed it is not so many years ago when we would not think of attempting to farm without all the timothy hay the horses could eat. As time passed our eyes began to open to the fact that it was a rather expensive fodder, so we tried something else. We sowed more clover. Then we began experimenting with different kinds of clover, red, alsike, crimson, etc., until we now have what we consider, with our present experience, the ideal fodder—lucerne or alfalfa. In Mexico, lucerne is the principal crop; sections of it have been growing for over three hundred years without once being broken up or reseeded Some years ago it set out on its northern journey. In the Southern States it produced wonderfully, and lucerne hay became one of the chief exports. At every railway station there were bales of it waiting for shipment. Soon it started westward, and in the Western States it proved a regular boon to the ranchmen. Gradually, step by step, in spite of abundant opposition and prejudice, it proceeded northward, and despite the oft-repeated cry that it could not stand a Canadian winter, it crossed the lines. and has for years been proving its adaptability to the climate and its great value to the Canadian farmer and feeder.

About ten years ago we determined to try this new plant we had read so much about in the American papers, and accordingly purchased a few pounds, and then made the same mistake so many others are making to-day—we mixed it with other grasses, so that if it did not come to anything we would still have something without it. For the first two years it did not amount to much, but as the timothy and red clover grew thinner it grew thicker. When we harvested the mixture the timothy and red clover were of good quality but the lucerne was more like small brush wood; nothing would eat it. It grew in clumps, brittle and good for nothing. This was an object lesson. Lucerne will not associate with other grasses. Its habit of growth will not allow it; it is a very exclusive plant. We were not discouraged, however, with one trial. We experimented again and again. I will give you our present method of procedure. which so far gives the best results. We sow with oats, barley or spring wheat, on soil well worked up, twenty pounds per acre. We sow in front of the seed drill so as to have it covered sufficiently, then harrow and roll well. When we cut the grain the young lucerne is frequently from twelve to fifteen inches high. It is disastrous to pasture it during the first fall; in fact, it should not be pastured for the first three seasons, if possible not to do so. Especially during the first winter the young plant requires all the mulch it can have.

We keep several paddocks near the barn for the purpose of soiling our cows. We generally commence cutting the first or second week in May. At that time we frequently have it two feet high What we do not use as a soiling crop we make into hay. For hay we cut as soon as the dew is off. It is preferable to cut no more than can be got into small coils before dew falls in the evening. We commence to rake up and put up when leaves are wilted; if allowed to lie too long the leaves fall off. Leave in small coil for two or three days to sweat and cure. If weather threatens rain put two or three coils into one. When sufficiently cured haul to stack and salt lightly.

Now I have merely given a rough sketch of our experience in the growing of this clover. To compare it with other fodders, and give *all* our reasons for thinking it the ideal fodder, would take too long. I will therefore give under a few headings several of our reasons for so thinking: 1st, we can grow more pounds per acre; we usually cut upwards of twenty tons of green feed per acre, from four and a half to six tons of cured hay where two tons of other hay would be considered good. 2nd. it does not require reseeding every year or two. Although a plow can kill every plant of it, yet if allowed to stand it increases in thickness. As I said before, Mexico has fields of it 300 years old. No wonder the Mexicans are lazy; they make their living so easily. What a relief it would be if Canadians grew a crop that once sown was there forever. In the Western States it has stood for years and is as good as ever. 3rd, it is not dependent upon rainfall. How often the dry weather stunts our hay crop. The roots of the lucerne, going down as they do from ten to twenty feet, penetrate permanent moisture and hence it is that a field of lucerne will thrive and look so fresh when the timothy in the next field is nearly burnt up I have seen a field that had not had a drop of rain for six weeks looking as "green as grass." 4th, It appears to increase the fertility of the soil. 5th, it is not confined to any locality or soil. Though it flourishes best in a balmy, moist climate and a warm alluvial soil, the Canadian winter does not materially affect it in any well drained land, light or heavy. On any soil where it can get its great roots down to the everlasting watering trough, look out for fodder. 6th, it cannot be beaten as a fodder ; all stock like it and thrive upon it. Last summer we milked eleven cows ; their milk was weighed and kept account of. Looking over the test one can tell when they received lucerne and when other fodder, simply by the increased flow on the lucerne and a decrease when fed other fodder. Stock of every description like it, and will eat it in preference to almost anything else. We think our horses will work and keep up in flesh on it alone as well as on timothy hay and roots. We intend doing more experimenting in this line next summer. 7th, it makes a very complete ration. We fed our cows corn, peas and oats, rye, natural grass together and separately, with and without bran and grain, but lucerne alone beat them all, both for cheapness and product. 8th, it makes an excellent pig pasture—"a pig's in clover" when he gets into lucerne. We have fatted pork cheapest in the pasture and whey. In the winter we cut and soak the hay for them. 9th, the last point I have time to mention is that lucerne is an excellent weed destroyer. The frequent cutting allows no weed to seed ; the dense stand gives it no room to grow and it gives up in despair. These and others are reasons that we have for preferring lucerne as a fodder, fed either green or cured as hay.

RAISING CLOVER FOR PROFIT.

By W. W. Scott, Glenallan, Ont.

We hear a great deal about raising clover for profit. Some think to enrich the soil is to sow a rotation of crops, viz. : 1st, a crop of fall wheat ; 2nd, spring wheat ; 3rd, a crop of peas ; 4th, a crop of barley ; 5th and 6th, a couple of crops of oats in succession, and then seed down with timothy and clover for a rest. The first year there is not much to be seen but clover ; the second year the clover is all gone, and a crop of spindling timothy hay is all we can see. Now we can safely say that field was run out before it was seeded down at all. Whereas, if one had seeded clover after the crop of fall wheat, or even a crop of barley the second year, the land could be kept up in good shape for a crop of any kind of grain, as the land can be kept in fertile condition by clovering every three years. For raising clover seed, seed to clover with fall wheat or barley ; keep the stock off the field the first fall after seeding down ; and if wanted for seed, put all your stock on the field the next spring as soon as they can get a bite at all. Keep them on it and let them eat it as bare as the floor, so that you cannot see anything but bare ground, (sheep are good to keep it down) Be sure and do not let it grow or even start till the 10th or 15th of June, then turn off all your stock and let it grow, and you will be sure to have a crop of clover seed from three to six or seven bushels per acre. But be sure you do not let it grow noticeably until you turn off your stock as just mentioned. We used to cut it short about the 18th of June, then let it go for seed, but those days are past. True, you might accidentally get a good crop of seed, but you can't depend on the old plan for two or three reasons, viz.: 1st, Of late we have the clover midge that seems to have two hatching seasons in a summer, and by cutting about the 20th of June it seems to just suit the midge, as the first lot is hatched and ready to lay their young in the crop of seed. Some years it will not even blossom at all ; every head is full of it, and by pasturing as mentioned you escape that pest altogether. 2nd, it is like holding a race horse till he gets the word go, then he will go for certain. So when the clover is not allowed to even get a stock or a stem on till you let it start, it will grow in good shape, head out, and fill up with seed. 3rd, it ripens so that you can get it harvested early, before the fall rains and frosts. When you cut your seed, if short, put a table on your mower. This you can make yourself. Take two strips, one by three inches, and lay them down behind the cutting-bar at right angles ; nail one-half inch basswood on it with two inch wire nails ; clinch them on the under side ; then have two one-half inch holes drilled through the cutting-bar about eight inches from each end ; bore two holes through the table where the strips are nailed on, about three inches from the edge; take common fence wire and run it through the holes two or three times. This makes the hinges of the table. Let it drag behind, and the swath divider lying on the table on the outer end is all you need; let one man follow and rake it off in small bundles with fork or rake. Do not cut it with the mower and rake it with the horse rake as you would hay, as it threshes the seed in the field; handle it very carefully when dry. Plow up the field the same fall and sow corn or peas the next spring, and you are sure of a crop. Sow to barley and seed down as before and you will keep up the land. A friend had a field completely run out, which was made up by seeding in clover one year and barley the next, for ten years, and it gave him forty bushels of barley per acre, and the next year five bushels of clover seed per acre. He has not had a bad crop on that field since; and this was done without manure.

If your land is low, heavy clay or sandy, sow alsike, as it will grow on land where the water covers it for a week in spring; it does not easily smother out, and if required for seed keep all your stock off the first fall, and the next spring do not let anything on it. Let it grow till it blossoms, then set your mower high enough to cut nearly all the heads off, or, in other words, top it and let it go for seed; by so doing you nearly double your crop as two heads will come on the stem where you would only have had one, as it branches out by topping. It also shortens the growth of the stem and enables it to stand up till ripe. Don't be afraid to cut; it will be white with blossom in a week or ten days after cutting. Be sure you do not cut too low the first time. When alsike grows long it blows down and the seed will not fill, and very often there will be no seed at all; but by cutting it off it avoids that danger. In harvesting, cut with table and rake it off in bunches the same as red clover; let the seed ripen before cutting, as it will not fill after being cut. In seeding down, sow from four to six pounds per acre; do not sow any timothy with it if for seed. If there is any red-dock, go through and pull it out, as the seed is about the size of clover and you cannot separate it, and as a consequence your sample will be spoiled. Save your alsike clover and it makes good hay after being threshed. Cattle like it, but it is not good for horses.

I have been in the clover-threshing business for several years, and have gleaned the above from successful clover men and from experience, and I find that farmers who observe the above are making clover-raising a success. I also find a number of farmers who are paying dear for their knowledge of red clover-raising by trying to get too much off their land, such as two crops per year, and not pasturing early and bare enough in the spring; also keeping stock on it too long in the summer—in some cases until nearly the 1st of July. Such plans will prove a failure.

IMPROVED AGRICULTURE.

By F. W. Rathbun, Deseronto, Ont.

The following is a synopsis of a speech delivered by Mr. Rathbun at a meeting of the East Hastings Farmers' Institute held in Deseronto last winter:

E. W. Rathbun was the next speaker. He said that he had always great faith in Canada and in Canadians, and the condition of affairs to-day justified all he had hoped for and the future gives promises of more. The farmer is subject to expenditures for education, church, hygienic measures, markets, roads, bridges, institutes, all calling upon him for expenditures which he must face, honor and profit by, or be swept from the ownership of the farm by those who recognize the progress of the times and intelligently respond to its promptings. To meet these demands, educate his family, dress becomingly, and pay his way is the problem which preplexes the mind of many a hardworking man. His sons and daughters grow up and attain to the age when they can render valuable aid in the farm work; he recognizes that if he avails himself of their services too much, it may be at the expense of their education, make them discontented with their lot, and injure their whole future. How to keep the young people on the farm and awaken in them an interest in progressive agriculture is a great problem in which all are interested. All the young people cannot be kept on the farm ; it would result in injury to the commercial interests of the country. The ranks of merchants and professions must be recruited from the country homes which turn out a vigorous class of young people. These when they have engaged in mercantile pursuits entertain fond memories of early days spent on the farm and naturally become the warmest advocates of agricultural colleges, dairy schools, improved highways, cheaper transportation and advanced methods of teaching, etc., knowing that these are essential to agricultural and commercial prosperity. We are all awakening to the fact that the condition of a community is greatly affected by the character of the highways upon which farm products are moved to markets. Forestry matters are also receiving due consideration as they have such an important bearing upon the climate and fertility of the soil. The setting out of orchards and shade trees, and the care of wood patches are also essential to attractiveness and profitableness of the farm. Discussion of the experience of those who have successfully mastered some of the difficulties mentioned cannot but bring some light, encouragement and aid to one another and start all to think, which is the commencement to progress.

Never in the history of agriculture have there been so many enemies to face, difficulties to overcome and inequalities to condend with as in this era, and while the ways and means of farming, dairying and manufacturing upon the farm are steadily increasing, much yet remains to be done before the business of farming is brought to that practical basis wherein the fundamental principles underlying shall be universally recognized. Our thinking men know that the cultivation of the soil, the development of, the dairying interests, the handling of our forests, the practical education of the boys and girls throughout our farming districts and the knowledge of the practical conversion of the new material of trees, soil and live stock into commodities ready for the consumer, are in our Province, particularly, the very essentials, and must be the foundation of successful agricultural and national prosperity. Our agricultural colleges and dairy schools are doing their grand work in response to the deep interest of agriculturists and the public recognition of the wide-spread benefits to result therefrom. Our commercial colleges, high schools and universities are maintained very largely by those who come from country homes—young men who wisely divide their time by helping in the farm work during harvest, and attending classes for instruction and study during the less busy season. Nothing could be more conducive to health and vigor, and to the making of earnest, intelligent and enterprising men than such a combination of practical work. Our great highways and transcontinental railways, our great manufacturing industries, all deal with and are largely dependent upon the soil and its products, to transport which our land and water highways have been constructed Upon the cost of raising wheat and other cereals, of producing beef, pork, etc., and of delivering these into the world's markets depends the profit or loss, not only of our farmers but of a large portion of the community. How interested are all classes, whatever be their calling or position in life, in the ability of farmers to produce the necessaries of life of a quality to command the best price and at a cost to leave a profitable margin.

It was well to note the relation of farmers to that branch of the sugar industry dependent upon the cultivation of the sugar cane and the sugar maple. What vast industries they have become elsewhere Canadians are manifesting a deep interest in and are closely watching the results of the manufacture of beet root sugar in the United States. Trees, clay, marl and limestone are very largely used in the industries. Great factories call for and prepare the fruits and vegetables from the soil in delicious forms ready for the consumer. Co-operative creameries and cheese factories convert the milk into butter and cheese, while other great works prepare the pork and beef, and even the offal, into various forms adapted to obtain the highest price at the minimum cost. Everything must be made use of, nothing wasted. Machinery and farm implements must be kept in order and ready for use. Live stock must be kept well cared for and kept growing into milkers or for market. Milch cows should enter upon their duties at two instead of three years of age and be kept at it for eleven months of the twelve instead of six. Porkers of 150 pounds dressed must be made ready for market in 140 days from birth. Idleness of man or beast must be discountenanced. Rapid changes in the wants of consumers must be considered.

A great defect in the agricultural condition of the country has been the lack of attempt to instruct children in rural, town and village districts in matters awakening an interest in country life. Work of this character has been successfully inaugurated in New York state and is now carried on under the auspices of the professors of agriculture in connection with Cornell University. There a new departure has been made by deputing a competent official to visit the schools of the rural districts to impart instruction, give object lessons and extend general agricultural knowledge. The results already have been most encouraging. It was gratifying to know that the energetic Minister of Education of Ontario is about entering upon this same method of instruction in this Province.

Mr. Rathbun proceeded to deal with the important question of the cost of transportation. He said that much, and indeed a great deal, had been accomplished, but yet much remains to be done before the agriculturists of this great country are placed on an equality with our neighbors in the matter of freight rates across the ocean. We should not overlook the fact that the people of the United States are putting forth herculean efforts to hold their trade and deliver their products into the world's markets at the least cost. Upon the Erie canal New York state alone is now expending $17,000,000 to cheapen the cost of transporting the products of the great West from Buffalo to New York. That canal is an excellent highway and an honor to its originator Dewitt Clinton. However, it can never be made to compare with our noble St. Lawrence, if we but remove the obstacles and make it free of toll or tax to American tonnage as well as Canadian. In the increased traffic that would follow we should find ocean steamers responding to the call and entering Canadian ports to receive and transport the goods.

Ocean freight rates from Montreal to Britain average a higher figure than from Boston or New York. The rates are largely governed by the quantity to be carried from a given port; the more there is to carry, the cheaper the rates. The saving of freight on the number of bushels of grain alone carried in 1897 would amount to the farmers of Canada many times the $300,000 per year it would cost the people of the Dominion to relieve all the boats on the St. Lawrence from tolls and charges. Even this vast saving represents but a fraction of what would be gained from a reduced rate on cattle, beef, sheep, pork, butter, cheese, lumber and forest products which now go by that route. The reduction would be sure to follow the policy mentioned. Add to that vast sum the saving in return freight on what now comes and on all material which would be brought into Canadian ocean ports both for Canada and the Western States. Many heavy goods from Britain and Baltic ports are carried to some of the Atlantic ports of the United States at even fifty cents per ton, while to Montreal he had not known them to be carried at less than one dollar per ton. A free St. Lawrence route would also encourage the erection of a great many more elevators from Kingston to Prescott. Nova Scotia mines would be benefitted by the increased number of ocean steamers, while great expenditures would follow in construction of river barges and steamers. Then consider the increased employment of labor and the greater demand for farm products which would follow this increased traffic. This work is before the people of this country and they should not rest content until this grand highway is opened up and its crystal waters carry the fruits of labor, agriculture, forests and manufacturing industries to the markets of the world at rates at least as low as our competitors enjoy. To accomplish this means a unity of interests with our great competitor to the south, ensuring a friendliness and kindly interest in each other which warships and armies cannot secure.

Vast as would be the advantages of this policy there is an economy which it is possible for every farmer to apply, and which will afford even greater and better results than those of the ocean freights. While the latter is obtainable at an outlay to the country of some $300,000 in the cancellation of the canal tolls, the other, which the farmer can inaugurate, means no outlay. It consists in running one of the most important machines of the farm eleven months out of the twelve, instead of six as at present. It means kind treatment and fair play to one of the farmer's best friends. It means the doubling of the earning power and the income of that machine. It is simply a change in the treatment and method of handling the milch cows of the country. The average yield of milk from each cow of this district for twelve months is 2,100 pounds. It is practicable to double this yield, in fact to increase it threefold. One factory in this district had expended $17,000 for milk; it might just as well, if farmers had wished, have spent $51,000 on the same number of cows. The labor involved during the cold months, and the small outlay in buildings to make the cows comfortable, are small matters compared with the profits which can be gained. The saving of the manure and its use on the farm will pay all the extra feed. Ensilage corn should be raised and fed to the cows. All these were things which should be carried out by the farmers of this country.

AN IMPROVED CONDITION; TRANSPORTATION; CHOICE OF CROPS; HONESTY THE BEST POLICY; IMPERIAL UNITY.

By Lieut.-Col. O'Brien, Shanty Bay, Ont.

Since I last had the honour of addressing you there has been a very decided improvement in the conditions of Agriculture. Good crops and better prices have rewarded and encouraged the cultivator of the soil. The stock breeder and the dairyman have each, in their respective branches of business, had more than average success, and the outlook for the future is as promising as the conditions of the present are satisfactory. The signs of material progress are everywhere visible, and their reality is shown by the increase in the exports, especially of agricultural produce, in the greater purchasing power of the farmer as shown by the increase of imports, and in the fact, about which there can be no doubt, that farming land is not only more saleable now than it has been for many years past, but that it is saleable at very much better prices.

Another matter of vital interest to the farmer is the increased attention which is being paid to the promotion of better and cheaper modes of transportation. In this respect the farmer has had much to complain of. He has first been heavily taxed, both in money and in the giving away to railway corporations of fertile soil, which should have been free for his occupation, and then he has been compelled to pay to these companies for the carrying of his produce, not only the cost of transport, and a reasonable profit on the capital invested but large percentages upon railway capital purely fictitious. He has thus been compelled to work for the enrichment of a few fortunate individuals, who have realized enormous fortunes, not by the labor of their hands or the legitimate exercise of intellectual power, but by a species of craft, which, stripped of its disguises, could only be regarded as the meanest kind of dishonesty. The time has certainly come, if indeed it had not come many years ago, that the farmer as well as the consumer, and all engaged in legitimate trades, should demand that in the absence of competition, the hand of a powerful and effective railway commission, should, so far as rates are concerned, control the operations of the great corporations which have a monopoly of inland transportation. The question of transport by water rests upon a different footing. There, happily, there can be no monopoly for the water is free to all, yet much may be done to reduce freight by water routes, whether on the great lakes or the ocean. The deepening of the canals and the improvement of harbor accommodation, so as to admit of the use of larger vessels, are steps in this direction so far as our inland waters are concerned. But no deepening of canals will avail us, unless, when our produce reaches an ocean port, there are vessels to carry it at reasonable rates across the sea, and therein is to be found the reason why, in spite of the advantages of our St. Lawrence route, ninety per cent. of our grain has been going to New York instead of to Montreal or Halifax.

The most effectual means of reducing ocean freight is the promotion of trade with the country that takes our produce, so that the vessels which come for it shall have an inward as well as an outward cargo. A secondary means is the subsidizing of lines of ocean steamers to just such an extent as will have the effect of bringing vessels of greater carrying capacity to our ports. This may be desirable, but what advantage can it be to the farmer, or the public generally, to pay large subsidies for ocean travel, so that first class passengers can be transported in the shortest possible time from the West to the East, or *vice versa*, it is hard to understand. A contract recently made for a very moderate sum, with a line of steamers direct to Manchester, which will carry our produce to the very doors of the largest consuming centre of the United Kingdom, may be attended with very useful results. Closely connected with the question of transportation is that of cold storage, by which perishable goods, such as fresh meat, fish and fowls, butter, eggs, fruit, etc., can be carried with safety and despatch, with certainty of arriving in as good condition as at the time of departure. This system gives to the farmer in all parts of the country the means of sending to distant markets, wherever they can be found, many of what may be called the by-products of agriculture, which, without this system, he could only dispose of in the limited market which his immediate neighborhood afforded him. Full information as to the best methods of raising all these various products, and of packing and sending them to the various markets, is given in the reports and bulletins which are so freely distributed among the members of the Institutes.

I may properly here call attention to the great advantage which the farmers of the present day possess in having freely bestowed upon them the results of the experiments which are being carried on by scientific as well as practical men at the experimental farms at Ottawa and at Guelph, and the teaching which is sent out from those institutions. By these means it is that the great dairy interest has attained its present value to the country; that the most profitable kinds of the various grains are ascertained and distributed; that the best kind of fruits, suitable to different localities, are found out; that the best means of destroying and preventing the insects that work havoc among our crops, and fruit trees are made known; and that in a variety of other ways the interests of the farmer are promoted. As an instance, I think it is no exaggeration to say that the entomological researches of Mr. Fletcher alone have more than repaid the whole cost of the experimental farm. As to the means of raising and disposing of the various products of the farm, so far as the operations of the farmer are concerned, a few words may be said. The best way of manuring and rotation of crops will be discussed at the meetings of the Institute, and in such matters much must be left to the individual judgment of the farmer, who should, to some extent, be guided by local conditions and experience. I think, however, that the general rule may be laid down that in the choice of crops a man had better be guided by what his land will best produce and by the method or cultivation he best understands, than by the market reports he sees every day. For instance, a man may be tempted, by seeing that wheat has risen in price to over a dollar a bushel, to put land under that crop which is really better suited for some other. After having done so he sees that, to use a current phrase, the bottom has fallen out of the market, that the war or the combination, which caused the rise has come to an end, or that countries on the other side of the globe, whose harvest seasons differ from ours, are already pouring such supplies into the market that all hopes of a high price must be given up. Let the farmer cultivate his soil to the best advantage, and leave speculation in prices to the "bulls and the bears."

Another rule that may safely be followed is that the more finished the product the greater the profit. In other words that, in general, it will pay best to sell oats, barley and peas, or other course grain and hay, in the shape of beef, pork and mutton, or butter and cheese, and thus keep on the land all that is taken from it by these crops, together with the elements derived by them from the atmosphere.

A third rule, and one that may be absolutely relied upon, is that in all our dealings "honesty is the best policy." Having determined upon the article we wish to sell, the first thing is to have that article the best we can make it; the second, to find out exactly the form and condition which our customers require the article to be in, and to follow that idea as closely as possible, and the third is to make sure that in the article we send there is no deception, but that that which is in the inside of the parcel is as good as that on the outside.

For want of adherence to this rule, in the particulars mentioned, many good markets have been lost to our farmers, and the fair fame of the country for honest dealings has been stained. It must however in fairness be stated that in such matters the farmer has not alone been to blame, for the dealer also has had a large share of the responsibility as well as of the consequent loss.

In conclusion I would like to call attention to the very important part that the farmer has to play in the great work of imperial unity and imperial development. The value of sea power in history, and especially in the history of Great Britain, has of late years been much discussed by the naval authorities, but the value of food power in the present day seems to me more important even than that of sea power. In the great wars of the present century Great Britain was not, as she is now, dependent upon other lands for her food supplies. Sea power, therefore, could be exercised independently of this condition. Now, in this event of war, sea power would be mainly employed in keeping open the routes by which food could be sent to the country. But if many, or any, of the ports of grain exporting countries were closed to British commerce, so far the sea power would little avail in finding food for the British Iles. But if the Canadian farmer could supply the deficiency the problem would be solved, and sea power would have only to keep open the routes across the North Atlantic Ocean. The time when this can be done has not yet arrived, but the nearer that we, the farmers of Canada, can in our generation bring about an approach to it the better for ourselves and the better for the Empire.

CONCRETE FLOORS.

By A. McNeill, Walkerville, Ont.

If the merits of concrete were better understood, undoubtedly it would supersede all other material for ground floors in out buildings on the farm. It is cheaper at first cost than wood, and when well laid with good material indestructable, so that the ultimate cost is still farther reduced. One barrel of good cement with sand and gravel will lay fifty square feet of ordinary floor, the labor of making being about the same as for wood.

From a sanitary point of view concrete is an ideal material. Wooden floors have cracks and spaces which, filled with filth, soon become breeding places for all kinds of foul odors and disease germs. Perfect purity in dairy products cannot be even approached with the ordinary wooden floor. Anyone who has done any repairing on these will readily appreciate the vile nature of the accumulation between and under the planks as well as in the fiber of the wood. Not only is this a menace to the health of the animals and their attendants, but it is a very large and absolute waste of the best fertilizers the farmer has at his command. It is no exaggeration to say that the saving in manure alone would, in a few years, pay the entire cost of the concrete floor. Another not unimportant point is the fact that there are no harbors for vermin of any sort, and it may be added, are much easier to clean, nor are animals so liable to slip on them, and of course all danger of breaking through is avoided. In short, concrete forms an almost perfect material for floors, and is rapidly coming into use among intelligent and progressive farmers.

In preparing to lay the floor see that the foundation is dry. It is presumed that the whole building is protected by a tile drain two or three feet outside the walls, this being carried to a proper outlet. Ordinarily no other drainage will be required. If, however, there are springy or soft spots in the floor surface, tile must be laid through these to the line of tile outside the walls. In some cases it may be well to excavate these spots and fill them with gravel in which the tile are laid. The surface of the foundation should be graded as nearly as possible to the floor line, but lower by the thickness of the concrete. Any material used to fill in depressions should be well rammed, a little at a time, so that there will be no further settling after the floor is laid. The ordinary soil is the only foundation required in most cases. If, however, this is not uniform in its nature, it may be well to use two or three inches of well firmed sand or gravel.

It is not my purpose to make any suggestions for floor plans. Concrete readily lends itself to any ideas the builder may have. The most complicated combination of level surfaces, slopes, manure drops or raised feed alleys can be most successfully laid by using a little forethought in going about the work. Floors are usually made four inches thick, in two layers. The first is gauged six of gravel and sand to one of cement. The finishing coat of one inch is gauged two parts coarse sand to one of cement. If fine gravel, the particles of which range from the size of wheat grains to the size of beans, can be obtained, a most excellent floor for light work may be made in one layer, guaged three to one and two or three inches thick.

In proceeding with the work it is important for large jobs to have a mixing platform, at least 14 x 14 feet, located in a convenient place. This may be made of plank or of ordinary inch boards laid side by side, bedded in a little sand and kept in position by short stakes at the sides. In gauging the material there should be no guess work. Measure all the sand and gravel and cement definitely and accurately. A convenient measuring box can be made of inch stuff, 2 x 2 feet and eight inches deep inside measure, without bottom or top. Divide this by a partition into two equal parts, each of which will hold one sack of cement or one-third of a barrel. To measure your material place this box on the mixing platform and shovel it full of gravel or sand as the case may be. It is now easily lifted and by putting the end of it across the heap a level surface is made on which it rests to be filled the second time. If the proportions are six to one the box is filled three times and then a bag of cement is thrown on the top of all and the material is accurately gauged and ready to be mixed. This should be thoroughly done before any water is added, by turning it over two or three times with shovels. Now make a depression in the top of the heap and pour on, say, one pail of water. With shovels now carefully spread the heap so as not to allow the water to escape. As this is absorbed pour on more until the material is all well moistened, but not sloppy wet. This is very important as any excess of water carries with it the cement, making some parts too rich and others too poor for the work intended. Beginners nearly always err in using too much water to mix.

If there are any irregularities in the floor, such as manure drops and raised feed alleys, these should be made first. A chalk line on the wall all around the building on the floor line will be a convenient basis to work from. A 2 x 4 scantling is placed on edge at a distance of, say, three feet, the upper edge being leveled to that exact floor line. This space is now filled in to the depth of three inches with coarse concrete, gauged six to one and firmly rammed. The remaining inch is now filled with fine concrete made of two parts coarse, clean, sharp sand, and one part cement. After this is rammed as solid as possible the excess is taken off by a screed, one end resting on the 2 x 4 scantling, the other on a thin narrow strip placed at the wall, the lower edge being the floor line. A notch is cut in one end of the screed to match the thickness of this strip. The surface is now ready for the finishing process of floating. A good wooden float is made of a piece of half-inch pine 6 x 12 inches, to one side of which a short handle is attached. With this float the surface till the moisture appears in a moderate degree and all irregularities are reduced. At this stage use an ordinary plasterer's trowel with a long even stroke and heavy pressure to give a surface to the work, and this strip of floor is finished. Take up the scantling and place it in position three feet from this work and repeat the process of filling with concrete and ramming, covering this with fine concrete also well rammed, screeding and floating. It will be noted that the screed runs on the scantling and thin strip every time, so that by carefully using the spirit level a perfectly uniform surface can be obtained. In finishing each piece of floor care should be taken to float the edges of the new and old work together so that there will be no ridges to mar the surface. Piece by piece in this way the whole surface is cemented. After the floor has been made it is very essential to keep it moist till it has had time to set—the longer the better. It is a good plan to cover with saw-dust or short straw kept quite damp. This can be allowed to remain as long as possible. It should be remembered that a concrete floor is easily broken before it has had time to set, and it pays to protect it at first with an extra amount of bedding or by boards.

There is no mystery about the use of concrete. No more skill is required in its use than in other operation on the farm. Make a beginning on some less important work and the experience gained will give confidence in larger jobs. The essential features are to measure carefully, mix dry first, then use only a moderate amount of water so that it may be rammed very solid ; use all mixed material as quickly as possible, and keep finished work, after the first few days, wet. Do not attempt work late in the fall when it will be exposed to the frost. It is useless to attempt to do any concrete work with sand or gravel having in it any clay or loam. Failure is certain. Nor is it economy to attempt to use too small a proportion of cement. After all the cement is not so large a proportion of the expense of a floor that we can afford to endanger the durability of the work to save a few dollars on the cement bill.

It may be well to explain that it is not at all necessary to use Portland cement. The best brands of natural rock cement or water lime differ from Portland mainly in the time taken to set. There is little difference in the ultimate strengh of the work and the one costs only about one third of the other.

FENCING.

By W. M. Grant, Woodville, Ontario.

The growing scarcity of suitable material, the necessity of utilizing the largest possible amount of our land and the vigilant care required to offer no asylum to the varied and ever increasing number of our worst enemies, must all be taken into consideration when this important part of the farm equipment is being attended to. In connection with it, however, in many instances a worse than waste of land is occasioned, for fence sides are too often made the dumping places for all manner of farm rubbish, soon to become harboring places for foul seeds, carried thither by winds and spring freshets, and so finding such places prepared for them they enter in and dwell there and bring forth fruit—abundantly.

It is a difficult matter to get at the root of the weed evil under the most favorable circumstances, but, hampered by roots, stems and heaps of other refuse, it becomes so nearly an impossibility that few undertake the difficult task. The consequence is that from these nurseries of farm corruption the seeds go forth from year to year to be foul the surrounding land, robbing it of its fertility and the owner of a portion of his income. There is an old adage which says " Nature abhors a vacuum," and in this matter of fence sites this is particularly true, for even if no rubbish is allowed to accumulate you have still a portion of your farm which is not utilized for crops and which cannot be properly cultivated. The likelihood is that a weed covering will be sent to cover nature's nakedness.

For the above reasons it would, I think, be well to adopt some system of temporary fencing that would meet the requirement of each year—some system of fence rotation, in conjunction with a properly conducted crop rotation, such as would give every part of the farm that cultivation which is necessary to produce the best results. There are also other objections to dividing farms as we usually find them. In the winter large quantities of snow accumulate along the fences, robbing our grasses and fall wheat of the greater portion of their natural protection and delaying spring cultivation by keeping the margin of the field wet while other portions are ready for the sower. And again there is no doubt that the handling of farm machinery would be much easier if the number of fences were reduced.

To remove the foregoing objections I would recommend some form of portable fence. For this purpose ordinary rails could be used, and by placing the material in the winter it would require only a short time to erect such as would be required. Much better, however, are the sectional fences used in some localities, being neat, convenient, and, I believe, more economical than ordinary material.

And, last of all, there is the matter of appearance. This, unfortunately. enters too seldom into the economy of the farm. But why should it be so? As a class we are nearer to nature than any other, and why should we do anything to mar her loveliness? The snake fence may in itself be very artistic, others are abominable; but the snake fence, associated as it invariably is with rubbish and the vilest weeds, is a rude break to nature's loveliness as the varying tints of the growing grains and grasses, changing with the changing seasons, each lending its peculiar charm to a harmonious whole. Let us join hands with nature and make our farms and our homes things of beauty so that in the end we may have an abiding joy.

HOME MADE LIGHTNING RODS.

By Thos. Baty, Wilton Grove, Ont.

There is no need to speak at any length on the importance of protection from lightning. I will merely read an abstract account of losses by the Westminster Fire Insurance Co., kindly furnished by the secretary, Henry Anderson, Esq. This is a mutual company whose operations are limited to the township and to farm and other insolated buildings.

"Losses from all causes for the six years 1892 to 1897, inclusive	$10,947 69
Losses by lightning, buildings	6,577 00
" live stock	598 94
Losses from all causes except lightning	3,771 75

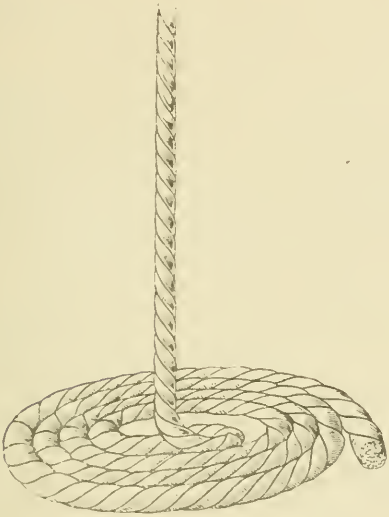
"In the years 1881, '82, and '83" (these, of course, were especially disastrous years) "the losses by lightning were $12,003 67, members' premiums in those years were $6,127.63." I had long had an idea that home made lightning rods could be put up as good as those for which exhorbitant prices are charged by travelling agents. Speaking on the subject to John W. Robson, of Vanneck, he showed me his buildings protected by rods made of several strands of galvanized fence wire twisted together. He had had them up for more than fifteen years. Last summer I followed his example and will tell you about it.

The rod made. The rod was made of nine strands of No. 8 galvanized wire twisted together. For each length of rod required the wire was measured and cut. Then each wire was bent into a loop at one end, hooked on to the short end of a grindstone and made fast. At the other end each wire was pulled through a separate hole in a short piece of board and bent to keep it from being pulled back. Then one person turned the grindstone and the other held the board, and in a very few minutes it was twisted firm. If I were doing it again I would use smaller wire, say No. 10, putting in twelve wires, which would make a rod weighing fully half a pound per foot. It would twist easier, have greater conducting surface for its weight, and ends that might be cut off would be more useful in fixing fences, etc.

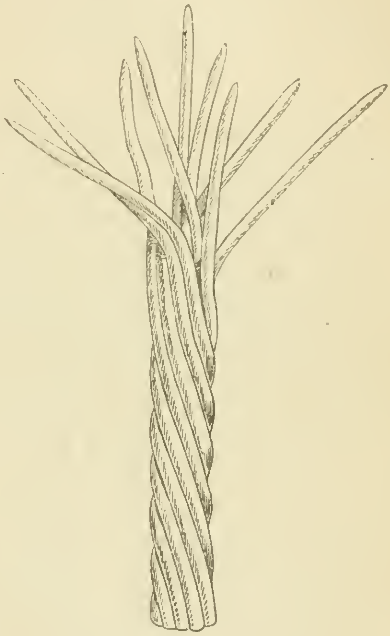
Ground connection. By means of a two-inch well auger, a hole was bored eight feet deep into wet quicksand, and the rod put down to the bottom.

Attachment to Building. Three-cornered cedar blocks, about three inches across, were nailed to the building, and to these in a notch across the centre the rod was nailed. Each rod was brought in as straight a course as possible to the ground. If I were putting up another rod I would dispense with the blocks and staple it right to the building. I could quote several instances of lightning striking which show that as long as there is iron to run on it will not harm anything else.

Points. The points are on the ridge of the barn, are about twenty feet apart and ten feet high. To get the height, light cedar poles six feet long were set up perpendicularly and stayed with wire; to these the rod was fastened. Each point (except one which was spliced to the rod leading from another point) has separate ground connection. At the actual point the wires are spread apart from each other—opened out.



Earth terminal recommended by Inspector Hunter.



Point endorsed by Prof. Lodge.

Labor, Weight and Cost. It took two of us (green hands) a little less than a day and a half to make and put up 240 feet of rod. Per foot it cost for wire $1\frac{2}{3}$ cents and weighs 9·14 of a pound. I dare say it is a good deal heavier than is needful, but I would make it at least half-a-pound per foot, which would cost $1\frac{1}{4}$ cents.

Thinking that it might be of interest to others and that I might get useful hints myself, I sent to *The Farmer's Advocate* an account—about as given above—of what I had done, and asked that they get the opinion of the authorities on home made rod. I shall quote several of these.

I wish now to say a few words bearing on the question whether rods of any kind are a protection from lightning. Do you know that telegraph and telephone companies, both in Canada and the States, have of late years put up lightning rods on their poles? It is the case. Not on every pole, but about a mile apart. The rod is merely a thick wire stapled to the pole, projecting a little above it and descending into the ground or around a bar of iron driven into it. *The Leisure Hour*, an English magazine, is authority for the statement that in England "lightning rods are now considered a necessary appendage on all public buildings." A blinding flash of lightning with a thunder crash the same instant startled my neighbor, J. F. Elliott, and family. A girl living with them was much alarmed because she was sure something had been thrown against the window, near which she had been sitting. On looking to see what damage had been done, they found a great gouge torn in the ground where the lightning rod had entered it, near this window—no damage whatever to the house. Some of the earth thrown out of the hole at the foot of the lightning rod had struck against the window, which was what had alarmed the girl.

In *The Farmer's Advocate* of September 1st, 1897, Mr. D. O. McDonald, Manager of the London Mutual Fire Insurance Company, which carries farm risks amounting to the sum of $15,000,000 annually, states that in an experience of over a quarter of a century only on about half-a-dozen occasions were barns struck that were protected with rods, and these were not burned; but the Company's actual losses from lightning averaged over $25,000 annually during the past five years, a portion of this sum, however, being on live stock.

On the question of the comparative value of the home-made rods, I will simply quote the opinions of authorities as given in *The Farmer's Advocate*. In the number of September 15th, J. Howard Hunter, Inspector of Insurance, writes as follows:

"Mr. Thos. Baty, in your issue of the 2nd August, has conferred a real boon upon our farmers by teaching them how to make and set up a serviceable lightning rod. As some of your readers perhaps have not seen Mr. Baty's letter, I would suggest that it be republished. Mr. Baty's lightning rod would be still more efficient if, instead of the wire rope simply descending into permanently moist earth, the earth terminal were formed by first coiling the rope into a flat spiral a foot or more in outside diameter (the larger the surface on the earth terminal the better), and then embedding the earth terminal in permanently wet earth. This would involve a little more labor than Mr. Baty's plan of simply boring a two-inch hole with an auger, but the labor will be well repaid.

"It would also be an important addition if, after the upright rods have been set up, as described by Mr. Baty, a piece of the wire rope were carried from end to end of the ridge and wound twice or thrice around each of the upright rods, so as to make good metallic connection therewith. This horizontal rope should be allowed to project say a foot beyond each end of the building, and the wires of the rope should be opened out and filed to blunt points, as should also the terminal wires of the upright rods mentioned by Mr. Baty. With the above additions, one upright rod of ten feet vertical height will be found to protect a circular space of twenty feet radius, so that a barn of eighty feet in length would be sufficiently protected by three such lightning rods distributed at intervals of twenty feet and connected together and grounded as above described.

"The present deplorable and wholly unnecessary destruction of farm property by lightning will soon be at an end if our farmers follow Mr. Baty's initiative. Yours very truly. (Signed) J. Howard Hunter."

In the October 15th number, Mr. Dearness, Public School Inspector, who had taken considerable interest in the subject, and who, while attending the meeting of the British Association at Toronto, met an eminent authority there, writes: "I had the opportunity of discussing Mr. Baty's fence-wire lightning rod with Professor Lodge, D.Sc., of Liverpool. He is an eminent physicist, and the author of "Lightning and Lightning Guards," the standard English work on the subject of which it treats. He said that with proper ground connection Mr. Baty's plan would work well; the conductors, to be effective, must terminate below, in water or damp earth; and that well galvanized fence-wire is an excellent conductor, much better than copper or its compounds. He disapproved of twisting the wires tightly; two loose cables of three wires each are far better than one tight one of a half dozen strands. Provided the ground connection be proper, the wires may be stapled to the building without insulation He saw no objection to Mr. Baty's plan of attachment. He seemed to think that a building whose highest lines and all projecting points were thus protected by single wires or loose cables terminating in damp ground would be well guarded. J. Dearness."

Mr. Dearness in conversation afterwards said that Prof. Lodge had spoken also about points. He said that to open out the wires at the end, filing each one sharp, made as good a point as could be got. I would draw your attention to the emphasis he put on proper ground connection. That is where the rods put up by agents are most deficient.

In conclusion, I want to emphasize three points. First: The home-made lightning rod is effective. Second: It is cheap. The wire to rod sufficiently a barn 40 x 70 feet, stable under, would cost $3.50, or less. Third: Anybody can make it and put it up.

BUSINESS METHODS IN FARMING.

By L. Stauffer, Waterloo, Ont.

This is a very important subject—one on which the success of the farmer largely depends. What would you think if I were to start here in the mercantile business and take no stock in my business, keep no account of my invoices, simply selling my goods for what I could get for them and keep no account of what money comes in or what goes out? How long would I exist? Why, you would say I could not do business that way very long. Now, that is just the state of affairs that exists on a majority of farms to-day. You ask farmers how much their income is, and they will go on to tell you what they have sold, but they omit to tell you what it cost them to produce that article and what profit there was in it; they simply state that it brought them so much and that they used the money. They cannot tell you what it cost to produce one single article on their farm or what it cost them to live. They sow the grain, reap it, feed the hogs and milk the cows, never thinking what any of it costs. How much better it would be for themselves if they could tell just what it cost them to produce that load of hogs, or that milk that goes to the factory, or that field of wheat.

It is not necessary to take a commercial course, or a course at the Agricultural College, while I believe each would be a good thing to do. It is said that many of the failures to-day in business are due to bad book-keeping. If you keep an accurate account of your expenses and your income, you can look over your accounts and see where you could have curtailed expenses. How often do you hear it remarked by farmers that farming does not pay, when they really are not in a position to know whether it pays or not—they are simply guessing. What I wish to emphasize is this, that a farmer cannot know what he is earning from the farm unless he keeps account, and that it is this feeling of uncertainty connected therewith, this groping in the dark, which deprives him of almost all stimulus to either economy or enterprise, with a consequent loss of content, self-respect and love for his calling. Adopt some simple method of book-keeping and carry it into effect, so that you can tell at any moment just what each article has cost you.

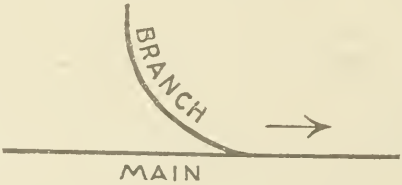
Another great feature of success is to keep yourself posted in all the details of your business, attend farmers' clubs, take a hand in the discussions, and get all the information you can from the experience of others. Never before has the farmer been so much in need of educating himself in his business as he is to-day in order to succeed. During these times of keen competition and low prices, a thorough knowledge of his business is indispensable. The inventions of later years, such as the telephone and telegraph, and the improvements in steam power, have brought into existence and established a net-work of railways and fast steamships to place the products of many countries on the markets of the world. These features have made competition so keen that the agriculturist must study and lend his energies to lessen the cost of production. On account of neglecting to farm on business principles how frequently we find farmers keeping a herd of six or more cows and actually feeding them at a loss. In many instances, cows, if followed up with weigh scales, will be found to be eating up the profits of the better cows and should certainly be turned over to the butcher.

Lastly, the farmer should be educated in his business in order to elevate his calling. How is it that farming is an occupation looked down upon by many so-called learned professions? Simply because farmers as a rule will not educate themselves, and they consequently have not enough self confidence. When competing with members of some other of the professions they are usually too often content to stand back and exclaim "I am only a farmer." In this way they themselves lower the dignity of their occupation. Men of the so-called learned professions are thus allowed to take positions to which they are not justly entitled. Such a state of affairs would not exist if the farmers of this country would educate themselves along the line of their work.

UNDERDRAINING.

By A. W. Peart, Burlington, Ont.

Where to Drain. Drains may be divided into two classes—simple, and those that are complex in their construction. A simple drain may be used with great advantage to draw water out of soils made wet by the soakage from higher and adjoining lands. For example, let us suppose that there is in a given field a slightly elevated strip of ground, consisting of a sandy or gravelly loam, which is of course very porous. Immediately below this ridge is a low, level-lying soil, composed also of gravelly loam, and having a clay subsoil. Now clay, as compared with sand or gravel, is relatively impervious to water, on account of the fineness of its particles and consequent smallness of its pores. The result of such a conformation of soil is that after heavy rains or during the spring the water runs through the porous higher soils to the non-porous lower ones, and there, unable to escape, the surface soil soon becomes surcharged with stagnant water, and consequently unfit either for cultivation or for vegetable growth. It is clear that something must be done if we wish to make any use of the land, so we run a simple underdrain along the foot of the ridge and parallel with it to intercept the water and carry it away. A simple drain is also very useful to draw water out of the narrow basins or hollows of rolling ground. In making these we use $2\frac{1}{2}$ and 3 inch tile, according to the lay of the land and the quantity of water likely to be removed. We use a complex system of drains where the soil is all more or less wet and unfit for producing an average crop. Very often several acres of a field may be found in this condition—the most valuable portion of it were it but reclaimed. Here is where systematic draining should be done, consisting of a main and several branch drains laid at a regular distance apart and emptying into the main one. Our average depth of the main is three feet, and we try to get all the fall we can—an inch to the rod if possible—using three-inch tiles under ordinary conditions. At the outlet we use a wooden pipe about six feet long, made of $1\frac{1}{2}$ inch lumber, and at its outlet end we make a grate by driving vertically long nails or spikes $\frac{3}{4}$ of an inch apart, so as to prevent rats and other animals from making a harbor of the drain in dry weather. The branch or lateral drains should not be laid so deep as the main by two or three inches, in order that the water may make a rapid delivery into it and thus avoid the accumulation of mud or fine sand at the junction, which would soon block it up. For the same reason branch drains should never enter the main one at right angles, but at an acute angle, thus the water of both flows and mingles unchecked.



The lateral drains should also have a substantial fall—in fact, the better the fall within reasonable limits the more permanent the drain. For these we use two-inch tile. As to distance apart of the laterals we can lay down no hard and fast rule, as we must be guided by the character of the soil and subsoil. A rule, indeed, has been given that "a drain draws water off on either side the square of its depth." A three foot drain, for instance, would be effective nine feet on each side. That would make the branches eighteen feet apart. On heavy clay soils it has been found necessary to lay them as close as sixteen feet, while on sandy or gravelly loams twenty-five or thirty feet apart affords a thorough drainage. It is a good plan after the tiles are laid and before any earth is filled in, to place inverted sods, straw, or some other vegetable material over them, then throw on this a covering of the heaviest earth—free from large stones—to the depth of eight or ten inches, which should be well packed by tramping. The sod prevents the soil from washing into the tile through the joints, and when it is decayed the earth will be set.

How to Drain If you want to drain a certain portion of the land the first step to take is to ascertain if you can get an outlet. If you can, then find out what fall to the rod you are able to secure. To do this it is necessary to use an accurate spirit-level, and if the proposed main drain be straight, make your first survey from the most remote point towards the outlet; but if it should be curved or crooked, make your survey by sections, but in any event a survey must be taken from the most distant point of the main drain to the outlet in order to determine whether or not sufficient fall can be obtained. If you cannot get enough fall, it would be waste of time and money to dig the drain. Of course there are situations where there is a good natural fall, and the use of the level might not be necessary, but where the fall is slight never attempt to drain without the level. In sighting the level, the man who uses it stands at the remote point and looks toward the outlet, where another man stands with a long stake driven perpendicularly into the level surface of the ground. Across this he holds at right angles a piece of lath or any straight edge large enough to be seen, and raises or lowers it as the case may be until the true level line is reached. Then measure the distance from the top of the spirit level to the ground, and also from the top of the lath to the ground, and the difference is, of course, the fall between the two points. The branch drain, too, must be surveyed and staked out, but if you can get a main there is no difficulty about the branches. Draining should be done when the ground is as free from water as possible; August and September usually afford a suitable time. In cutting a drain, a great deal of labor is saved at the start by going a round or two with the plow, plowing as deeply and narrowly as possible. In the course of a drain it is necessary to dig lighter or deeper according to the undulation of the surface of the soil, so that the fall or grade may be regular or uniform. This is a point of vital importance, for if the fall is not steady and constant the drain will block up with fine sand and be useless. In digging a drain, also, make it as narrow as you can conveniently work, and thus save labor. In grading the bottom, if there is no running water, one of two devices may be used. You may take a straight edge board, seven inches wide, say, and twelve feet long. Assuming that the fall is one inch to twenty-four feet, that is, 1 12 of an inch to two feet. We start digging our drain of course at the outlet end. We use a spirit level two feet long. When we have reached the proper depth at our starting point—the outlet—we make that the basis of our grade. We make a grade level out of our straight edge board by tacking a piece of leather or wood on the edge two feet from the end, and 1-12 of an inch thick. This edge we keep up when we place the board on the bottom of the drain. Apply your spirit level to the packed edge and end of the board—always remote from the outlet—and if the mercury shows a dead level that means that you have 1-12 of an inch fall to two feet, or ½ an inch to twelve feet in the bottom of your drain. Continue this process as you dig and grade the bottom—drawing the straight edge along every few feet and applying the level—correcting the bottom as may be necessary, and thus you will have a uniform fall. It is of prime importance that no tile should dip the wrong way, if they do the result is a deposit of sand. Another plan is—assuming the main is straight—drive in three pairs of stakes, three stakes on each side of the drain, one pair at the outlet, another about the centre, and the third at the remote end. You have previously found the fall of the drain, say two feet to 600. Make your outlet stakes two feet lower than the top of the stakes at the remote end. Sight through and make the tops of the intermediate pair of stakes in a line with tops of the others at the ends. Then tack three pieces of straight edge to the tops of each pair of stakes, and they will be in a line. When you have got the proper depth at the outlet, cut a stake so that when it is placed in the drain vertically the top will be in a line with the straight edges on the three pairs of stakes. Every few feet in grading the bottom of your drain try your stake, always keeping its top in line, and thus you will have a uniform fall. Of course when you get beyond the second pair of stakes you will have to turn around and look toward the outlet end. Starting at the outlet in laying the tile, always aim to make the joints as close and small as possible.

Cost of Draining. The cost of tile draining varies according to the soil and other circumstances. Assuming that the average depth is three feet, and that the laterals are twenty-five feet apart, the cost per rod would probably vary from forty to fifty-five cents, and per acre from thirty-five to fifty dollars. The above is for contract work, but if you should do the job yourself the cash cost will of course be much less. The price of labor and tile varies in different parts of the Province, so that no hard and fast figures can be given. Now, while I am a firm believer in draining, and find from experience that it pays well to tile low, wet soils, which in their natural state produce little or nothing, still I am convinced that under the present condition of farming it will not pay to drain land which is comparatively dry or rolling, or has a good natural drainage. The advantages would scarcely be equal to the expenditure involved. I have found that our drains laid in wet soils have paid for themselves in from four to six years after they were put in, and after that it is all clear profit.

Benefits of Tile Draining. It allows a person to cultivate the soil from a week to ten days earlier in the spring, and also enables one to work it at other seasons of the year, when otherwise it would be in a very muddy condition. As a result there is an earlier harvest, which means both a heavier yield and a better quality of grain, fodder, roots, or whatever may be grown. Frosts are avoided which might otherwise destroy the crop. Wet soil is also cold, much colder than dry soil. This is due to the greater evaporation which draws the heat from the soil, thus making it very susceptible to the influence of frosts. In vineyards this is somewhat strikingly shown during seasons of late frosts, when the leaves of those vines on low, wet spots are seared, while those on dry soils in the same field escape unharmed. Drainage also fertilizes the soil from the atmosphere. Rainfalls, instead of running away over the surface, as where the land is wet, pass down through the soil laden with nitric and carbonic acid and ammonia from the air, which are absorbed and held by the earth and used for plant food. It also allows the air to circulate through the soil, thus enriching, pulverizing and unlocking its vegetable and mineral supplies. Manures applied to wet lands are practically wasted. When they are drained they are our best soils, being generally rich in humus and not requiring manuring perhaps for years, but should it be necessary to further fertilize them, the use of manure can then be made effective. In fact, it would be difficult indeed to overestimate the value of underdraining.

TOBACCO CULTURE.

By L. C. Palmer, President South Essex Tobacco Growers' Association, Kingsville, Ont.

In the cultivation of tobacco, not the least important point is the necessity of having an abundant supply of strong, healthy plants. In order to attain this end, great care should be taken in the preparation of the seed beds. The tobacco growers of Essex county adopt three methods of growing plants, viz., the hot-bed, cold frames, and in favorable seasons excellent plants, healthy and of strong vitality are produced by simply sowing the seed in the open ground from the middle to the last of April and giving proper attention to the watering and weeding of the beds In adopting this last method of growing plants a sheltered location is preferable, with a slope to the south. Plants do better on burnt than on unburnt beds. Hence, it is the custom to haul a quantity of rubbish, straw and brush and cover the bed to the required length and width and burn the ground thoroughly. This is best done in the latter part of the fall of the year, say in November before the fall rains and while the soil is comparatively dry, as the burning is of far greater advantage if done before the land becomes saturated with water. After burning, the ground should be thoroughly spaded over so that the ashes may be completely incorporated in the soil. The freezing and thawing during winter sets free the fertilizing elements contained in the ashes and puts the soil in the best possible condition for the growth of plants. In spring, about the middle of April and when the land is in proper condition for cultivating, the bed is raked over with a garden rake and the surface made as fine as possible when the seed is sown. In sowing the seed, it is best to mix it with corn meal, or ashes, or land plaster, as the exceeding fineness of the seed renders it very difficult to get it evenly on the bed. The bed should not be raked after the seed is sown, as there is danger of getting the seed too deeply covered in the soil. The method generally followed is to run a hand roller over the bed, or pat the ground over with the back of the spade, or press it with a board or piece of plank. The seed should not be sown too thickly. One ounce of White Burley is known by actual count to contain about 380,000 seeds, but scarcely more than seventy-five per cent. of tobacco seed of the best quality can be expected to grow. A single plant, if all the seeds grew, could produce seed sufficient to plant two hundred and fifty acres of tobacco. It is usual in Essex County, and in the Northern States of America generally, to sow about a tablespoonful of seed to one square rod of land, but as the aim should be to produce strong, stalky plants, possibly a less quantity would be preferable, especially if the seed is known to be of strong vitality. If the bed is made from four to six feet wide, it would be a good plan to put a cheap frame around it, consisting of boards about sixteen inches wide along the north side and from eight to ten inches wide on the south. By stretching a double width of cheap cotton over this frame, the heat from the sun is retained in the bed during night and injury from spring frosts is avoided.

In localities more subject to early fall frosts than in Essex county, the hot-bed or cold frame would be the safer way to grow plants. In building a hot-bed, a bed say five feet wide and of the required length should be dug out to the depth of sixteen or eighteen inches. Put in the bottom of the bed six or eight inches of straw—wet straw from the bottom of an old stack is best. After the straw is well tramped in, place over it about eight inches of fresh horse manure containing a liberal quantity of bedding. A sufficient quantity of the above material should be used so that the bed will be about filled after being well tramped in, over the manure spread about four inches of rich, loose earth. The top soil where the bed is dug will be most convenient if sufficiently fertile and of fine texture. The length of the bed should be from east to west. A frame of boards is put around the bed, after the manner above described, and strips of wood are placed across the frame every three or four feet to prevent the cotton from sagging down on the bed. A great deal of care and considerable skill is necessary in the management of the hot-bed to produce the most satisfactory results. Some growers leave the cotton over the bed day and night while the air is at all cool or till about the middle of May, except on warm days, only removing it long enough to water the plants If the hot-bed is made as above described it may be raked over so as to get a fine, even surface, and the seed sown immediately in the manner previously described. If a large quantity of manure is used, say sixteen inches or more in depth, the great heat in the bed might injure the seed if sown immediately, so that it would be necessary to delay sowing until the temperature of the bed had fallen to about ninety degrees.

Some experience and a great deal of care and attention are necessary to the successful management of the hot-bed, but if carefully and skilfully managed fine plants may be grown and be ready for transplanting by the last of May or first of June.

Cold frames are made by constructing a frame-work of boards of the required length and width and covering them over with sash and glass, no manure being used except what may be incorporated with the soil to make it sufficiently fertile for the vigorous growth of plants. The cold frame is possibly the best method to adopt for raising strong, healthy plants sufficiently early to produce the best quality of leaf and the largest yield per acre; but the great expense, together with the uncertainty as to the market, deter most growers from adopting this method. Messrs. Hiram Walker & Sons, of Walkerville, Ont., have about three-fourths of an acre under glass for the purpose of furnishing plants for their tobacco farm, which contains about one hundred and fifty acres.

TRANSPLANTING.—The transplanting should be done as soon after the first of June as possible. On low undrained soils it is best to ridge the land to the height of from four to six inches. On porous or well drained soils the best results, taking one year with another, are obtained by planting on the level. If planted by hand the ground may be marked out in the same manner as for corn and the plants set three feet and a half each way. Some growers put the rows farther apart, say three feet ten inches, and the plants from three feet to three and a half in the row. These distances would apply to large varieties such as the White Burley and the Connecticut Seed Leaf. Cigar varieties of an upright growth, such as the Havana Seed and Zimmers' Spanish, may be planted in rows three feet apart and from eighteen to twenty-four inches apart in the row. One person can drop plants for two to set, dropping two rows at a time. The planters follow, making a hole with the planting peg, and setting the plants so that the outer leaves are drawn together, thus giving some protection to the heart of the plant from the heat of the sun, but not deep enough to cover the heart with earth. If the soil is nice and moist and the transplanting is followed by a moderate shower of rain, nearly every plant may be expected to live and grow. If the planting is done in very dry weather and no rains follow, scarcely any can be expected to live. Hence, it is the custom to wait for what is called a season, that is a nice shower of rain to make the soil moist and put it in proper condition for planting. Hand planting, however, is fast being superseded by the transplanting machine. This is a two-wheeled machine drawn by two horses and plants one row at a time watering each plant as it is set. In ordinary seasons no delay need be occasioned by lack of rain but plants can be set as soon as they are ready and a much better stand ensured than by hand setting. Machine set plants start more quickly and grow and mature more evenly than hand set plants. In preparing the land for using this machine it is only necessary to harrow until the surface is finely pulverised and then roll or firm the soil with a planter. It is better for the soil not to be too wet but it should be in proper condition for cultivating. If the land is worked so as to make it very loose or ashy, the work will not be so good. Land should be plowed early for tobacco and the surface kept fine and free from weeds by the constant use of the smoothing harrow. Too frequent use of the disc harrow is apt to make the land too soft and loose to secure the best results from machine planting. The machine most commonly in use in the tobacco sections of the United States is called the Bemis, and is made by the Fuller & Johnson Mnfg. Co., of Madison, Wisconsin, and has been in use on the farm of Messrs. H. Walker & Sons for the past eight years and gives the best possible satisfaction. The Messrs. Walker purchased two new machines in 1898.

CULTIVATION. Cultivation should begin as soon as the plants are set and continued as long as the horse can get through between the rows without injuring the leaves. The hoe should be regularly and persistently used to keep the soil loose and free from weeds around the plants. All suckers must be removed and not allowed to attain a length of more than two inches as they tend to absorb the vitality of the plant, which should be entirely utilized in the complete growth of the leaves which constitute the farmer's harvest.

PESTS OF TOBACCO. In growing plants the only enemy to contend with is the flea-beetle, the same insect that preys on young cabbage and turnip plants and sometime onions when grown from seed. If the beds are covered with glass or cotton no damage need be sustained from this insect, but where not so covered considerable injury is sometimes done to plants by this pest.

Grasshoppers in dry seasons do great injury to the leaves by eating holes in them. Injury of a similar character is also occasioned by a greenish tree cricket, somewhat resembling a grasshopper. About the only remedy for these pests is a mixture of one part Paris green to twenty parts of wheat flour and dusted on the plants while the dew is on them. The mixture of Paris green is put in a thin cloth and fastened to the end of a stick three or four feet long and dusted on the plants by slightly tapping the stick. Care must be taken not to put too much of the mixture on the plants—not enough to make them whitish.

These pests of tobacco above mentioned are insignificant when compared with the tobacco worm, or horn worm, as it is sometimes called. This is the same worm that is sometimes found on tomato plant and absolutely sets a limit to cultivation of tobacco. His capacity for devouring the growing tobacco is so great that whole fields if neglected are sometimes destroyed in about a week. The tobacco worm comes from a small egg of a pea-green color and about the size of a turnip seed, and is generally deposited on the under side of the leaf to which it is made to adhere by a viscid substance. The egg gradually turns to a creamy white, and in about a week the tiny worm emerges from the shell and immediately enters on its work ot destruction. It can easily be detected by small round holes eaten through the leaf, upon the under side of which it will be sure to be found until it has attained a length of nearly an inch when it begins to wander over the plant. In about twenty days it attains full maturity when it is a hideous looking creature about three inches or more in length and as thick as the little finger with a spikelet or horn on the end of its tail, hence the name horn worm. These worms descend into the ground, where they pass through the chrysalis state, whence they emerge as moths. This moth is the fruitful mother of the second crop of worms which is so destructive to the tobacco crop during August and September. The only sure way of saving the crop is to search every leaf and destroy them. This requires the most constant care and the utmost vigilance. A full grown worm, when his appetite is at its best, will devour nearly a full grown leaf in about twenty-four hours, and does not confine himself to one plant, but wanders from plant to plant. This makes it difficult sometimes to find these large worms which may be hidden in the ruffles near the stem or in the loose earth at the base of the plant. The number of worms may be lessened by destroying the moths which lay the eggs. These never make their appearance till about sundown, when they may be seen with their long tongues probing the deep corollas of the petunia, evening primrose, or jimson weed, when they can be easily caught and destroyed. The tongue of this moth is five or six inches in length and is coiled up spirally, like a watch spring. From their large size and manner of flight they are sometimes called the humming bird moth. These moths can be poisoned by means of a solution of cobalt, one ounce, water, one pint, and molasses or honey, one-fourth of a pint. Put a small quantity of the above solution in the base of each flower of the jimson weed. The moths coming out about sunset to suck the sweets from the blossoms are poisoned in considerable numbers. Chickens, ducks and turkeys, especially the latter, are very useful in diminishing the number of these pests and preventing their ravages.

Hail storms are very destructive to the tobacco and from these there is absolutely no escape. High winds, accompanied by heavy falls of rain, do great injury to the leaves, breaking them and tearing them into shreds. If a good stand of plants has been secured and proper attention given to cultivation, there is probably no more luxuriant crop grown than tobacco when it has attained its full growth.

TOPPING. There is some diversity of opinion as to the right height to top the plant. The most experienced growers recommend topping to about ten or twelve leaves besides the ground leaves, making fourteen to sixteen leaves in all. Large vigorous plants on rich soil may safely be topped to a height of eighteen to twenty leaves. If the plants are set late they must be topped low to ensure ripening before frost. In topping care should be taken to pinch off the button or flower bud so as not to injure the small tender leaves which are very susceptible to injury, and which, however slight, will develop into serious blemishes when the leaf has attained its complete expansion.

Cutting. When the plants are fully ripe, which is easily determined by the mottled appearance of the leaves, their thick texture, and by a susceptibility to crack when bent between the thumb and finger, they should be cut. It is best not to cut tobacco too soon after a dash of rain or while the dew is on. Care should also be taken not to cut the crop when the sun is very hot, as the too great heat of the sun burns the leaves, leaving dark green spots, which permanently remain, injuring the quality of the cured product. In the afternoon, from three to five o'clock, is a good time to cut tobacco, late enough to avoid sun burn and early enough to wilt so as to be put in piles. In cutting tobacco the stalks are first split in half by placing the knife at right angles to the two upper leaves and splitting the stalk down to within three or four inches of the ground. Then grasp the the stalk with the left hand about the centre, shove it over, and cut it off as near the ground as convenient. Invert the plant on the hill and proceed to the next one. In half an hour the plants will be sufficiently wilted to be handled without breaking the leaves, when they can be placed in piles, each pile containing the number of plants required to fill a stick, and the piles so arranged that a wagon can pass down between them The plants can be straddled on the sticks in the field or they can be taken to the barn before being so placed. In the early days of tobacco growing in Essex round poles were utilized on which to hang the sticks, but latterly two by four scantling for upright supports and inch lumber six inches wide and twelve feet long is used to support the ends of the sticks. The tiers of tobacco are placed about four feet apart, so that a building sixteen feet high would contain four tiers. Some growers scaffold the tobacco in the field for a week or more. This practice is all right if the weather is fine, but if there is danger of rain it is far better to haul at once to the barn, as rains are injurious to the quality of the leaf. The sticks are usually four feet long, and six or seven plants can be put on each stick. The sticks when ready to be hung in position should be placed about twelve inches apart, depending entirely on the size of the plants and the extent to which they are wilted. After being hung in the barn the plants should have plenty of ventilation until thoroughly wilted, say for a couple of weeks, when, if the weather is favorable, all openings should be closed during the day and opened at night. The most skillful and most successful tobacco growers are of the opinion that drying is not curing, that certain chemical changes take place in the leaf cells of the plant which are absolutely necessary to produce a cured leaf of the highest quality, and which are prevented by a too rapid drying of the leaf. If there should occur a season of warm, damp or foggy weather, all ventilation possible should be given to prevent rot or poleburn. In the latter stages of the curing process light should be excluded as far as possible. as it is found that a strong light has an injurious effect on the cured leaf. Although this crop has been grown in varying quantities for a good many years in this county, the system of curing and caring for the crop after being cut is very crude, and the tobacco industry in this county may truly be said to be only in its infancy. Farmers utilize their barns and sheds in which to cure the crop, having no facilities for the exclusion of light and air, and the wonder is that the product is of as good a quality as it is. By using barns of the most approved construction and the exercise of skill in all the various stages of the curing process, there is no doubt but as good types of smoking tobacco can be produced in south-western Ontario as in any of the tobacco sections of the northern United States. Our White Burley tobacco, with our crude processes of curing, is said to compare favorably with the product of the blue grass region of Kentucky.

Stripping and Preparing for Market. After the stalks have become well dried, stripping may begin whenever the tobacco is in case—that is, when the leaves are sufficiently limpid or pliable not to break when bent or handled. It usually requires from two to three months for tobacco to cure sufficiently for stripping. Most growers take down a large quantity of plants when in proper condition, and place them in bulk by removing the sticks and putting them in a long pile, the stems being placed outward and the tops overlapping. If piled in this way and covered with corn stalks or any coarse litter, old rugs or pieces of carpet, to prevent drying out, stripping may be done any time during the winter whenever the weather is not too severe. The leaves are taken from the stock and tied in hands or small bundles, a dozen or more leaves to the hand. Pains should be taken to make the hands as neat as possible, to give it an attractive appearance and ensure a ready market.

Generally three grade of tobacco are put up by farmers—the ground leaves, or lugs, constituting the cheaper grade, the top leaves the second grade, and the middle leaves constituting the best grade. The crop of 1897 all went in one grade, the buyer (there being virtually only one) disregarding quality entirely. It is hardly likely that the same indiscriminate purchase of all kinds and qualities will obtain for the crop of 1898.

Market. The market for home-grown tobacco has been very fickle and precarious. The early settlers, some forty or more years ago, depended almost entirely on tobacco for a money crop, and quite large fields were of common occurrence. But absurd restrictions placed by government on the growing and marketing of the weed killed out the industry till you could hardly find a tobacco patch in a day's travel. Latterly some encouragement has been given to the industry, and the imposition of ten cents per pound on imported raw leaf tobacco had stimulated the production and placed the cultivation of this crop on a paying basis. Still the tobacco growers labor under a serious disadvantage on account of the absurd system of licenses and excise revenue which in the past has enabled one buyer to control the market of the entire crop. Our statesmen must be educated to pursue a policy which shall develop instead of discourage this industry. So long as the weed is imported and manufactured for consumption every legitimate effort should be employed to the production at home of the great bulk consumed in the country. Absurd restrictions and complicated regulations in the way of licenses and excise revenue should be abolished and replaced by a uniform system of license and excise, thus giving perfect freedom to the manufacturer to blend the domestic and foreign leaf in any way which might suit him, and thus open up a market for home grown tobacco in every factory in the Dominion.

The American policy of removing every possible obstruction in the way of domestic tobacco culture, trading and manufacture is the only right policy, and has made the United States the greatest exporter of tobacco in the world, and has brought wealth and prosperity to some sections in the Union which otherwise would have remained in poverty. Tobacco is one of the greatest of revenue producers, being heavily taxed by every government. Great Britain, noted the world over for her free trade policy, puts an import tax on raw leaf tobacco of about eighty cents per pound, or about 1,200 per cent. of its cost of production. The importation of raw leaf tobacco into Great Britain and Ireland in 1895 was nearly 90,000,000 lbs., on which a revenue was collected of about $70,000,000. If the colonies had a preference in the English market of, say, five cents a pound it would give southern Ontario such a boom as would make it not only the garden of Canada but the most prosperous and wealthy district on the continent of America.

PIONEERING IN DRYDEN.

By G. M. Yeomans, Dryden, Ont.

I found in pioneering in Manitoba, and I find here, that most of the difficulties and many of the hardships can be turned into helps and pleasures by a little attention and skill. All that is required is a determination to make the best of everything (time included), to succeed and make success certain, and to find contentment and many pleasures under apparently very unfavorable circumstances.

In Manitoba pioneering, and here now, there are pests and many of them. Probably first among them may be placed the flies, but a little attention and forethought makes a blessing of this great pest. In all new, unsettled districts it is impossible for the average farmer to fence in his stock for a season or two. Now if stock running at large is made comfortable at any permanent place—and a little flame or smoke, or both, renewed as required, will make them so, if flies are as thick as clouds—the flies will bring them to this place. Even when there are no flies habit brings them to the old peaceful camping ground—no need of hunting, missed milkings, lost time, lost temper or lost stock. These tormenting flies drive our cattle home at the right time of day and so save us many long weary walks. And all through the pioneer list of little curses many great blessings may be found, but the changed conditions, unforseen difficulties and general worry of getting everything running smoothly in a new country, and looking at the thorny side, are sufficient to cause many to throw up the pioneering job just as they are getting through the "bush" and have learned to overcome or avoid the many difficulties. It was the same on the Portage Plain, Rapid City, Grand Valley and everywhere else, and will be so here at Swan River and farther west. The only way to prevent this, and the only way to insure success to all as the reward for fighting on, would be to do as was done by Cortez, destroy every vessel that could take the adventurers back to what they think ease and civilization. As a rule we need not expect to obtain anything of value in this world for nothing. Generally, the more valuable the more effort it takes to acquire it. When any family (and families succeed best) expects in a year or two to have possession of a beautiful home and well-stocked farm, equal to those obtained in the east after ten or fifteen years' work, they are sure to be disappointed. I and my family were among the first to take up farms and move into this district. We were old pioneers, and expected the usual difficulties in beginning in a new unsettled district, and as matter of course we found rough roads and "mud that is mud," and flies. But the pioneer who can't stand this had better hold down any soft snap he may find in the east.

In all my pioneering, covering some fifty years (and all of it in successful pioneering), I have found fewer difficulties and more natural advantages here at Dryden than in any other farming part of the Dominion. Our work in clearing here is play compared with early days in Frontenac and Hastings, and fighting flies is only fun compared with the same job in Grey or Bruce in 1855, and the mosquitoes in Manitoba in 1873.

Parts of Manitoba may be more desirable than this for the first few years, but to make a big showing for the capital, especially if that capital is largely bone and sinew, energy and patience, I would say come to Dryden. This is safe advice for anyone and everyone who wishes to clear and trim up and build up a valuable, beautiful home that money will not buy, after a few years of patience and toil.

No amount of sitting around or yarns count here, or in any new country, but industry does, and industry alone is to be preferred to capital alone, but industry and capital prudently applied should run up in value certainly and very rapidly. Good land near to the biggest, busiest railway in America, at fifty cents per acre, can double in price several times and not be dear land then.

The climate in Dryden equals Manitoba, probably a little milder in winter and entirely free from blizards, and in summer not so dry. Our virgin soil is very rich and free from noxious weeds, and municipal or other mortgages. Our land is very cheaply put under cultivation, free from stumps and stones. A larger part of it is nearly prairie land. I cleaned and got under cultivation a large stretch last fall for less than I ever did prairie land, and it is in better condition.

Clover jumps into life at the slightest reasonable invitation, and makes immense crops of hay and pasture. All these things are well worth seeing, and must be seen to be fully appreciated, and can be seen without any telescope.

I let a job of clearing from fifty to one hundred acres on my farm to two able men, at two dollars per acre. I furnished them, free, a comfortable house with stove, etc., and permission to work on the roads or at anything that turned up, and do my clearing as the season favored. But these two men and the neighbors soon settled that no land could be cleared for two dollars per acre. My reasoning was that where the fire had run so effectually without any coaxing it should do good work with it. But this counted for nothing, and the job was thrown up in disgust. I subsided of course, but kept my eyes open all the same, and the first favorable day I rough-fired a large stretch of valley and hill, killing all green brush and weeds The following spring I picked up, chopped and logged what the fire had left on sixty five acres of this rough burning. After finishing the logging and piling up, I offered the job of burning the whole sixty-five acres at fifteen dollars, but Mother Grundy decided the job could not be done for less than fifty dollars. It just cost me twelve dollars to do it well and at the right time.

The time taken for this clearing was so short the sceptical wished to sum up the actual cost while the whole performance was fresh and simply done, and to the surprise of all, even myself, that clearing from first firing to having it ready for the seed and harrows, cost just sixty-five dollars—one dollar per acre.

Next came fencing, which was proportionately low, for good cedar posts were conveniently near where they were wanted, and did not cost more than one cent each, distributed along the fence line. Now, I and my family have a large farm, half of which is fenced with good cedar posts and barb wire, bull strong and calf tight, at a very moderate cost.

The only conundrum left is, how much stock will the farm carry? One thing appears fairly certain, and that is, that eastern land requiring manure and costing thirty to fifty dollars per acre cannot compete with land costing but little over one dollar per acre, and particularly adapted to growing hay and pasture.

Farms equal to mine are plentiful here yet, and farms partially improved are to be had nearer town at a small additional cost.

FARMING IN MUSKOKA, ITS PAST, PRESENT AND FUTURE.

By Miss Alice Hollingworth, Beatrice, Ont.

Not more than thirty years ago the backwoods of Muskoka were very much as nature left them, save for here and there the small chopping of a lonely settler and the clearings along the margins of the creeks made by the beavers to build their dams, remains of which may still be seen. Those who lived away from the main road were obliged to shoulder their provisions and follow a blazed line, through swamps and over rocks, on through the forest, which if not actually pathless, was practically roadless. About this time a few families possessing some slight amount of education and culture, pushed their way into these wilds, believing—emigrants to a new country always do—that they had reached the land of promise, and if the milk and honey were not instantly visible they would appear shortly along with the rest of good things. For a while the social enjoyments of city life were forgotten in the novelty of backwoods life, and the concentration of mind and muscle necessary to make a start excluded repining. But after the craving for mental food asserted itself, and in 1873 the heads of four families united their efforts to lay the foundations of a society, which, if it had not died for want of support, might have been highly beneficial for those who—then growing boys and girls—have now families of their own, and their children must seek elsewhere than at home if they desire to gain the knowledge that their parents spurned. I have before me the combined minute book of the "Mutual Improvement Society." It contains a few financial accounts, the minutes of four business meetings, the roll of officers and members and a code of rules. Rule 2 says: "The object of this society shall be, as far as our means and abilities will allow, the advancement of each other in reading, writing, arithmetic, geography, music and other kindred sciences, and the cultivation of social intercourse." The use of tobacco, intoxicants and bad language in the hall was strictly prohibited. A resolution was passed that an annual festival be held on Christmas Eve, the cost to be defrayed by mutual contribution. A small log hall was erected and the expense, though small, was not by any means equally borne by the members, as frequently happens in larger undertakings than this. The "Mutual Improvement" was a dead letter from the very first, but it was quite refreshing to witness the energy that was applied to carry out the resolution for a Christmas festival. As the time drew near, great piles of evergreens were brought from the woods, and the little log hall was festooned from end to end with wreaths that bloomed profusely with paper roses, and all around were gaily painted mottoes in rustic frames. A substantial supper was provided, and when the merry dancers gathered from far and near the scene was a festive one truly, and all that could be desired by those who readily scoffed at the idea of an intellectual feast, too ignorant to know their need of it. This was continued till 1881, when he who had been the main leader in conducting the parties was brought home and laid to rest in the family burying ground, a stone's throw from the hall where he had been instrumental in giving so much pleasure to others. After that the hall was closed, and so also the history of the Mutual Improvement Society. Since then several efforts have been made in the line of mutual improvement societies but always with the same result—it is amusement, not instruction that is wanted. At that time the only available veterinary was a man who also bore the honors of being a leader in church and school matters, and could neither read nor write. Why should he? He knew more than all the writers of books could teach him. Among the farmers of that day in this locality there was but one who sought to improve his methods by the aid of agricultural journals, and he was scornfully named the "book-farmer." He is still book farming and finds it profitable, while the homesteads of many of the old wiseacres have long since passed into the hands of mortgage companies.

It was in the beginning of the seventies that lumbering became an active industry in Muskoka. The majority regarded it as a great boon, but it proved instead a curse to the farming industry. Few men tried to improve their farms as long as they could earn a little ready money in the lumber camp. This would not have been so bad had the money thus earned been judiciously spent, but the abominable practice, so irresistible to lumbermen, of finishing up a job by going to the tavern in a body for a "jolly good spree" has sent many and many a man home to his family with empty pockets, having left his winter's earnings with the tavern-keeper. The crops were put in hurriedly, no time for draining, stone picking or fencing. The wife and children, who had already plenty to do, had to run through the fields at all hours of the day and night, chasing out cattle and scouring the woods for dead poles and branches to keep the fire going, while the farmer (so-called) hastened away to the "drive" (floating the logs down the rivers) or to some roadmaking job, returning to take off the crops and then away to camp for the winter. If he didn't spend his money in the tavern he was pretty sure to be swindled by a decamping paymaster. Somehow little money ever found its way to the farm. This went on year after year; some progress, of course, was made, but meanwhile much discontent was breeding. There was no money in farming; Muskoka was not a farming country, and everything was wrong side out. The country was being flooded with the most extravagant accounts of the glorious North-West. The ambition to own a prairie farm became an absolute craze. Those who could not raise the means otherwise mortgaged their farms and went. Some took their families along, others were wise enough to go alone, and these never failed to come back and quietly settle down on their Muskoka farms. The first tannery was built on the Muskoka River at Bracebridge in 1876. This gave rise to a new branch of industry, but one that was much more profitable to the tanner than to the owner of the bark, for prices were low and roads bad, making large loads impossible. With the advent of competition prices rose. The worst thing about it is there is no sale for hemlock logs, and millions of feet of the best lumber lie rotting in our woods, not only a loss but an actual menace to the country in dry weather. It also gave rise to a new evil. Short-sighted people, thinking only of present gain, mortgaged their farms as heavily as possible, then stripped their woods of tanbark, sawlogs and firewood, after which the money-lender had to take the farm for his pay with small hope of making his own out of it, for who would buy a farm that had neither improvements nor timber to recommend it, so long as better could be had. Another class of unscrupulous individuals (not yet extinct) have made a practice of going through the country buying bush lots for which they gave their note and perhaps one payment while they remove everything of value from the woods, and then leave it on the hands of the original owner. As a natural result about one-fourth of the farms were lying in commons ten or fifteen years ago. Yet in spite of this the country has prospered, and now it is exceptional to find an unoccupied farm.

One feature that has contributed very materially to the prosperity of Muskoka is the tourist trade. Our lakes are now so famous as a summer resort that a description of them is scarcely necessary. It is sufficient to say that all available space on islands and shore is occupied by gaily-painted cottages and large, well-equipped summer hotels, which from June to September are filled with tourists from all parts of the continent. We might remark, parenthetically, that some of the above-mentioned tourists appear to regard themselves in the light of a revelation to the natives of the backwoods. And truly they are! Such examples of dress and manners never before dawned upon our vision. But we forgive them their peculiarities for their omnivorous appetites provide us with a sure market for farm product.

The first Muskoka farmers' institute was organized in Bracebridge in 1890. Others soon followed and are in active working order, though considering the population they do not receive half the support they should. During the present season the institutes chartered a train for an excursion to the Ontario Agricultural College, which proved such a success that it will no doubt become an annual institution. Unstinted praise is bestowed on the officials at the College for their courteous efforts to make the visit both pleasant and profitable to the excursionists. The Travelling Dairy has visited us twice, and we believe they left the country better for their having been in it, but unfortunately their audience was nearly a small one, nothing to compare with the crowd that will assemble for a 12th July parade through the dust, a political meeting or even a good noisy revival. They found that all through this northern distiict the milk tested one per cent. more butter fat than in the older parts of the Province. This tells to our advantage in the cheese factories, several of which are doing good work around here. Twenty-five or thirty years ago there was only one team of horses in Muskoka, not every man could afford a yoke of oxen, scarcely one man in a dozen owned an overcoat, musical instruments and sewing machines were almost unknown, and as for farm machinery, why, there wasn't any. Now, oxen are as scarce as horses used to be; ere long our sheds will be ransacked for the clumsy old ox yokes to be placed in the museums as relics of the past. It is now a common sight to see farmers and their wives in winter drive out with fur coats and fur robes in plush upholstered cutters. In summer it is covered buggies and bicycles. Almost every house has a sewing machine, organs are nearly as common, while pianos are not unknown. The old log houses and barns have given place to good frame buildings, some faced with brick, others built of stone. In the field you will find the horse cultivator, hay rake and mower, and self-binder and reaper, and in the capacious barns are hay forks worked by horses, also horse powers for cutting feed, etc. The ensilage cutter with carriers, gasoline engine, Babcock tester and milk separator are among the most recent arrivals. The silo was introduced nine years ago and has proved highly satisfactory, but is not generally adopted.

Many orchards have been planted of late years, and we are praying that the endless army of fruit tree agents will pass on to the Klondike, Mars, or anywhere; we've had enough. Wild fruit grows abundantly, though it is becoming more scarce as clearings are extended and the increasing number of sheep and cattle eat the leaves and young shoots. Yet with all our gains it is as hard as ever to make ends meet, because our wants are always in advance of our means. There are many ways in which we might husband our resources where now they are wasted. Perhaps one of the worst evils is our system of road-mending. It is done by statute labor, and pathmasters are chosen without the slightest regard to qualification; indeed, if a pathmaster takes interest enough in his duties to bother the council for tools or the labor due for non-resident lots he is ejected and a more thorough stick-in-the-mud put in his place.

The greater part of the time that is put on the roads is entirely wasted. If the men are not spinning yarns in the shade, you will find most of them filling up holes with mud that the next heavy rain will wash out, although there is abundance of granite and gravel on the roadside. Nothing but the short-sightedness of the farmers prevents us from having the best roads in the world. They "can't afford" to make them good, but they *can* stand the expense of having them bad. Even more senseless than this is the common practice of spending large sums of hard-earned money on machinery, waggons, etc., and then leaving them exposed to the weather all the year round. They "can't afford" to build a shed, although they have plenty of timber on their own farms; they never count the cost of this expensive habit. Nor do they realize how much is lost by irregular hours in milking, feeding, and general carelessness in handling cows. Attention to many such details would greatly increase the farmer's income and lessen his dependence on outside elements.

In regard to the future of farming in Muskoka, that will depend entirely on the people—the country is all right. All the best agricultural papers in circulation could be bought with the money that nine tenths of the men and boys spend in tobacco, and these if properly studied and their instructions followed would vastly improve matters for those who cannot or will not see their way to take a course at the Ontario Agricultural College.

Another valuable source of agricultural education is the farmers' institute, so easily and so cheaply obtained; but the coming farmer is the one who is the most conspicuous by his absence in the meetings of the institute, although he is the very one who should be most interested in the success of the institution. The heaviest drawbacks against which we have to contend is not in the nature of the country or climate or bad government, but the mental laziness of the young men. They don't want to learn anything new, they won't take advantage of the chances that are placed before them. A few there are among us who make an effort to keep abreast of the times, but like angels' visits they are far between. Let us hope that they may be the leaven that in the near future will permeate the whole community.

Another important factor in the prosperity of this locality is the establishment of branches of manufacturing industries. Our environments are such as to offer great facilities for such a purpose in not a few lines. It would give us a better home market for our produce and find employment for those who are not content to remain on the farm.

LIVE STOCK DEPARTMENT.

CORNCOBS OF VALUE AS FOOD.

BY W. A. HENRY, DIRECTOR WISCONSIN EXPERIMENT STATION, MADISON, WIS.

Like many other feeding materials, there is a great deal that is not known in regard to this common product of the farm, and what appears in this communication should be regarded as representing in some measure the conclusions which may be drawn after a careful review of the situation at the present time.

Below are given the average analyses for corn, corncob, and corncob meal. The table shows the digestible nutrients in 100 pounds of each :

——	Protein.	Carbo-hydrates.	Ether extract.
	lbs.	lbs.	lbs.
Corn	7.9	66.7	4.3
Corncob	0.4	52.5	0.3
Corncob meal	4.4	60.0	2.9

The analyses show that the corncob contains almost no digestible protein and fat, while a considerable amount of the fibrous material yields to digestion. Not only then is the corncob a very unbalanced feeding stuff but we may suppose that the inert material from its fibrous, hard character will prove unsatisfactory to animals where supplied in large amount or where heavy feeding is essential, though it may be quite useful in special cases and in certain combinations.

Where animals are being maintained merely, corncobs may prove quite useful, since they will furnish bulk or volume to the food while supplying some nutriment. Such feeding is analogous to supplying straw. We know that animals which are not gaining in weight may be supplied with straw quite advantageously. Where cattle are being fattened the ration must contain a large amount of digestible matter, and in such cases either straw or corncobs cannot advantageously constitute any large part of the feed. On the other hand, where the constituents of the ration are very concentrated in form, the digestive tract may not be properly distended when such feeds only are supplied. It will not do, for example, to feed steers upon grain and oil meal only, not because such feeds are harmful in themselves but because bulk or volume is an essential factor in digestion as well as nutriment. When feeding heavily on grains, then, some coarse material must be given and corncobs may supply this in part along with a little straw or hay. We may suppose that corncobs will take the place of about the same weight of hay or straw. The nutriment furnished to fattening cattle by the cob will have some feeding value, but probably its use in no small measure comes from furnishing volume to the feed and in part also to giving variety and to furnishing feeding material of a little different consistency from pure meal.

At the Kansas Agricultural College Prof. Shelton conducted two trials in which corn and cob meal was fed to one lot of steers and corn meal to a second lot. In each trial ten steers were divided into two even lots of five each, one getting the corn meal and the other corn and cob meal, the roughage consisting of oat straw, orchard grass hay and clover hay, being alike for both lots. The first trial lasted 140 days; the second 150, with the results shown below:

—	Average weight at beginning.	Total feed.	Total gain.	Average gain per steer.	Meal per 100 lbs. increase.	Average daily gain per steer.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Experiment, 1884—						
Corn and cob meal	815	11,565	1,580	316	732	2.25
Corn meal	847	11,612	1,460	292	795	2.08
Experiment, 1885—						
Corn and cob meal	1,128	12,918	1,025	205	1,260	1.44
Corn meal	1,150	12,654	1,085	217	1,166	1.36

It is shown that the corn and cob meal gave the best daily gain in both cases. In one instance less corn and cob meal was required for a given gain, while in the other more was required. The average of the two trials shows that a pound of corn and cob meal is equal to a pound of pure corn meal for steer feeding.

Trials conducted at three of our agricultural colleges—New Hampshire, Missouri, and Kansas—to determine the value of corn and cob meal for pigs are summarized in the table appearing below:

—	Average weight at beginning.	Corn and cob meal eaten.	Corn meal eaten.	Gain while on		Feed for 100 lbs. gain.	
				Corn and cob meal.	Corn meal.	Corn and cob meal.	Corn meal.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
New Hampshire	52	1,915	1,527	416	317	460	482
Missouri	161	2,893	3,196	456	638	634	501
Kansas	199	3,619	3,832	557	572	650	670

In the New Hampshire and Kansas trials corn and cob meal proved superior to the same weight of corn meal, while in the Missouri trial corn meal was more valuable.

The student who follows this discussion to the present point will at once raise the query, How can corncob have as much feeding value as corn meal? It should be borne in mind that these results were obtained when a limited amount (about 20 per cent.) of corncob was fed along with the corn meal. In all feeding operations, especially in cattle feeding, there is a very large waste of the nutrients when much grain is fed. It would seem that the corncob in some way helps prevent this waste or reduces it in some measure.

On the whole we may conclude that the corncob has a use and place in many feeding operations, and this leads to a consideration of its preparation. Where cattle handle the cobs without difficulty in consuming the whole ears of corn or ears, which have been chopped into pieces or more or less crushed by some process of reduction, I should not consider it worth while to give them any further treatment, but let the cattle masticate them as best they can. Where the grains of corn are hard and the cobs hard and dry cattle will not usually eat a sufficiently large quantity of corn to give the best returns. In such cases the ears of corn should be soaked to render them easy of mastication, or the corn and cobs should be reduced to meal by grinding. For pigs, of course, the cobs must be reduced to meal.

The grinding of the entire ear of corn calls for a large expenditure of power and the apparatus for this purpose has not proved satisfactory in many cases. Those who seek for light on this point will find grinding mills advertised in the various agricultural papers. Any mill ordered should be taken on trial, but he who uses them should expect that the grinding of the cob will require a large amount of additional power over the reduction of the grain merely. Reduction by mere crushing of corn grains and cob will often be found quite satisfactory and requiring less power.

If experience shall show what has been maintained in this article, that a pound of corn and cob meal is worth a pound of pure meal for feeding purposes when corn and cob are ground together, then cobs have sufficient value in many cases to pay for their reduction to meal. For pig-feeding purposes at least the cob should be reduced to quite fine particles. Mills that will reduce the cob to pieces an eighth of an inch in size without much extra power will be found to require a great deal of additional power to reduce the cobs to anything approaching meal in fineness.

BRITISH HORSES IN AMERICA.

By Alexander Galbraith, Secretary of the American Clydesdale Association, Janesville, Wis.

The subject which has been chosen for me is comprehensive enough to fill a good sized book, and to bring it within the compass of a short paper requires some condensation and considerable abridgement.

Consider for a moment what our live stock would be if separated from, and independent of, importations from Britain. If you can do so you will then be in a position to appreciate the play of Hamlet with the character of the Prince omitted. Whether we all realize the fact or not, we are really indebted to Britain and the careful intelligence of its breeders for at least nine-tenths of all our imported live stock. What, for instance, would our cattle be without Shorthorns and Herefords, Polled Angus and Galloways Devons and Red Polls, Sussex and Ayrshires, Jerseys and Gurnseys? What would remain of our mutton sheep if we eliminate the Southdowns and Shropshires, the Oxfords, and Hampshires, the Cotswolds and Cheviots, the Lincolns, the Leicesters and Dorsets? Even in swine we are indebted to old England for our Berkshires, Yorkshires, Cheshires, Essex, Suffolks and other breeds. In horses there are the Thoroughbred, the Hackney, the Cleveland Bay, the Suffolk Punch, the Clydesdale and the Shire; and in ponies, the Welsh, the Exmoor and the greatest of all Liliputian equines, the Shetlander. About the only other countries to which we are indebted are Holland for tha Holstein cow, France for the Percherons, and that unhappy kingdom of Spain for the material to manufacture our long-eared and long suffering mule.

Coming to the horse department we are at once confronted with the English Thoroughbred, the greatest race horse the world has ever seen and the progenitor of our own unequalled American trotter.

Mr J. H. Sanders, in his book on "The Breeds of Live Stock" says: "The Thoroughbred horse is peculiarly a British production. Of the Oriental sires, it is generally admitted that the Godolphin Arabian, imported into England in the year 1728, 170 years ago, is the last that has proven of any special benefit to the English stock; and while the blending of the blood of the Orient with the old races of England furnished the foundation, there cannot be the slightest doubt that the care and skill of English breeders in selecting and coupling with the stoutest, best and fleetest, for successive generations, has been a more potent agent in the foundation of the breed as it now exists than the Arabian and Barb blood to which tradition has ascribed its superiority. Many importations of the choicest blood of the Orient has been made both to this country and England within the last half century, and yet scarcely a name among them can be found in the pedigree of a horse that has distinguished himself upon the turf. In every instance in which the speed and stoutness of the Thoroughbreds have been tested side by side with the Arabian they have proven superior to their eastern competitors. This fact is so universally recognized that nearly all countries upon the civilized globe have for many years regarded the English Thoroughbred or "blood horse" as the basis of all substantial equine improvement." The same writer adds: "Our American horses are largely permeated with the blood of the English Thoroughbred. Many of the best stallions and mares of England have been imported to this country and their influence is seen on every hand. It enters largely into the ground work of all our trotting strains, and it is doubtful if a single great road horse or trotter has been produced in this country that did not possess a large share of this royal blood as a foundation upon which the trotting superstructure has been built."

Next comes the Hackney horse, and we find that his introduction to this country dates as far back as 1822, when Mr. James Boott, of Boston, imported the pure-bred Hackney stallion known as Jary's Bellfounder, recorded in the English Hackney Stud Book as No. 55. Bellfounder was foalded 1816; was bred by Roger Jary, Norfolk, England; imported in July, 1822, and died when 26 years old. He is described as a bay horse, 15 hands high, and before importation trotted two mile in six minutes, and nine miles in less than 30 minutes, thereby winning a purse of 200 guineas. His dam, Velocity, was the fastest trotting mare of her time, going sixteen miles an hour, and on one occasion 28 miles in one hour and forty-seven minutes, rather better than a four minute gait for 28 miles on the hard road. As is generally known, Bellfounder sired the Kent mare, which in turn produced the immortal Rysdyks Hambletonian, by far the greatest progenitor of high-class speed at the trot which the century has developed. It is quite unnecssary for me to say anything in praise of that great horse, but the following statement of fact is noteworthy: At the close of the year 1891 there were 51 horses in this country with records of 2:15 or better, and of these no fewer than 36, or fully 70 per cent. of the whole were direct descendents in the male line from Hambletonian, while several of the remainder were also related to him through the dam's side. Many of Hambletonian's characteristics, we are informed, resemble those of his grandsire, Bellfounder, notable for his docile temper and lofty knee action. It is indisputable that the strong, well balanced trotting blood of Bellfounder infused in union with the warmer, higher strung, Thoroughbred blood of Messenger, produced that happy combination which enabled our people, with unconquerable persistence and skill, to develop and improve our trotting horses up to the present high standard of extreme speed.

Coming to more recent times, however, the Hackney has been imported to this country in considerable numbers, but owing to the great value of the better specimens, they have been and are confined for the most part to a limited number of wealthy eastern breeders. The best specimens have cost from $10,000 to $20,000 each in England, figures, it is needless to say, far beyond that paid for any other breed outside the race horse.

The cross of the well-bred Hackney sire on American trotting mares has been attended with great success, many competent and well informed people maintaining that in this way the highest type of carriage horse can, with greater certainty, be produced than by any other means. From the well selected dam we get quality and speed, while the Hackney sire supplies the bone, substance, style and bold, lofty action so valuable and so rare in the average trotting-bred horse.

The Cleveland Bay is another English breed which acquired a large measure of popularity in this country ten or fifteen years ago. His chief recommendations were a uniform, solid bay color, plenty of size and well carried, long flowing tail. When crossed on mares of fine quality and action the Cleveland sires got many fine styled coach horses of the large, rangy type suitable for heavy carriages, but as a breed they do not stand comparison at all with the Hackney, either in point of endurance, style, action or impressiveness.

Coming now to deal with British draft horses, I find that the earliest authenticated importation was fifty-six years ago, when Mr. Archibald Ward, of Markham, Ontario, brought across a stallion called Grey Clyde—the name indicating both breed and color. This was followed at intervals by an occasional stallion being imported, my father having the distinction of breeding, raising and exporting from Scotland the sixth draft stallion that, so far as the records show, ever crossed the Atlantic. This horse's name was Buchanan, and he also came to Canada just forty-seven years ago. No regular importing business was done, however, until well on in the "seventies," after which the trade kept steadily and rapidly increasing until about the year 1889 when high water mark was reached, and from which mark the ebb tide was surprisingly sudden and complete. To give an idea of the magnitude of the trade which has developed within the last twenty years or so, I may state that there are about 9,000 stallions and mares recorded in the the American Clydesdale Stud Book, 500 in the American Shire Horse Stud Book, and probably 3,000 more are divided between the Hackney and Cleveland Bay Stud Books, and perhaps a number approaching 2,000 that, owing to the recent depression, have not been recorded, but are eligible for record. This gives a total of something like 20,000 pure-bred British horses in this country (apart from the Thoroughbreds and ponies), three-fourths of which are draught horses.

But it is of course not the pure-bred Clydes and Shires, but the grade horses—the get of these imported sires and dams—that are most in evidence in our markets and on the farms throughout Canada and the United States, and the total number of which cannot be estimated or even guessed at. In a vast country like ours, peopled by so many nationalities, and with men of such varying opinions, it would be simply impossible for any one breed or type of horses to give satisfaction to all, and this is why in certain localities the Clydesdale is preferred, and in others the Shire, then the Percheron, Belgian or Suffolk Punch. As a rule, the Irish and Germans favor the Percheron, while other nationalities prefer the British horses, claiming for them greater strength, more ambition and truer action For the domestic trade in our cities, especially for light draught or general purpose work, I think the majority of buyers favor the dark colored Percherons, but where horses are wanted for heavy draught in city or pinery or export, the Clyde and Shire grades are generally preferred and sell for most money. The weakest points in our draft horse breeding operations have hitherto been injudicious mating, imperfect raising of the colts and the use of inferior sires from want of experience and good judgment. Many farmers patronized stallions simply because the color suited them; others because the horse was large and their mares small; others because the services were low or the stallion conveniently near. Inferior and unsound stallions were imported and sold in large numbers for the profit there was in them, and farmers bought those horses freely because their judgment was defective and their experience quite limited. With all these shortcomings, however, no impartial man whose eyes are open can deny that a wonderful improvement has taken place in the general character of our draft horses during the last fifteen or twenty years. The average weight has increased probably 300 to 400 lbs., with additional strength in proportion. With the repeated infusions of draft blood has come a quieter and more equal disposition in our horses. They are more docile, more easily broken and handled; they do not run away on the slightest provocation, and they naturally haul very much heavier loads than formerly.

The improving leaven of the British draft horses on our native stock has been as far reaching as it has been beneficial. From the Atlantic to the Pacific, and from the Southern States to the most northern part of the British possessions may be seen any day the descendants of a Darnley or Prince of Wales, a Lincolnshire Lad or an Honest Tom. Beyond the Rocky Mountains the British draft breeds enjoy a practical monopoly, they being the only draft horse that can stand the climate of Oregon, Washington and other North-western States. Other breeds die off prematurely, while the Clyde and the Shire thrive and multiply as well as they do in Illinois or Ontario. With the revival in trade comes an increasing demand for heavy draft horses, and wherever such demand is accompanied by intelligence and experience the British horse will be wanted more and more.

THE MARE AND HER FOAL.

By J. Hugo Reed, V.S., Guelph, Ont.

As the present state of the horse market strongly indicates that the breeding of good horses can be made a pleasant and profitable business, a few hints as to the proper management and care of breeding mares and their progeny may not be out of place. The hygiene of pregnant mares does not differ materially from that of other animals of the same class. The brood mare should be kept in moderate condition, neither excessively fat nor excessively lean. Pregnant animals should have food and water of first class quality and in a reasonable quantity. She should have regular exercise, should not be subjected to excessive exertions, either muscular or respiratory, ordinary farm labor or ordinary road work is probably the best work. Work in harness is preferable to saddle work, but if subjected to saddle work spurs should not be used, as their use is apt cause violent contraction of the abdomenal muscles which is liable to cause abortion. Excitement of all kinds should be avoided, especially with mares of highly nervous temperament. The use of purgative medicines should also be avoided if possible, as they tend by their drastic action to cause abortion. Surgical operations should, if possible, be avoided. As the period of parturition approaches the amount of work should be lessened, but a reasonable amount of gentle exercise, either in harness or in the lot, should be given. She should now be fed largely on soft food, such as bran and chopped oats with a little linseed meal, in order to keep her bowels in condition and favor the secretion of milk. She should be given a box stall, as roomy as possible, without boxes or mangers, in which she might drop her foal. She should be carefully watched by an intelligent person, as, though as a rule, a mare will pass safely through the act of delivery without extraneous aid, in some cases the assistance of a man is required in order that the lives of both dam and progeny may be saved. The man to whom the duty of watering is entrusted should be a careful and intelligent person, and if he has a scientific knowledge of the act of parturition all the better. If interference is not necessary of course he must not attempt it. Uncalled for interference, especially in primipera, may do great damage. He should have sufficient knowledge of the act to enable him to tell when aid is required; then, if he has not sufficient knowledge or skill to give the required aid, he can immediately send for more skilled assistance. In some cases the fœtus is born enclosed in the membranes (after-birth) and will suffocate at once if these membranes be not ruptured either by the dam or the assistant. The navel cord, if not ruptured, should be attended to by tying a soft cord tightly around it about an inch below the skin and then cutting it off an inch below the string. It is a good practice to dress the navel with a good antiseptic. Corrosive sublimate, one part to one thousand of water is probably the best. Frequent dressing with this for two or three days keeps the parts healthy and prevents the entrance of the germ which causes navel ill. If the colt is weakly the assistant should assist it to suckle the dam frequently, until it gains sufficient strength to take nourishment without assistance. It should also be carefully watched to see that it passes urine, and if not, a veterinarian should at once be consulted, as in some cases there is a false membrane closing the passage, and a catheter has to be passed to break down this membrane.

The action of the bowels should be carefully watched. A great many colts die from the retention of the meconium, (the contents of the bowls at birth). This is dark in color and of a tough, tarry consistence and exists in lumps or balls. In many cases the lumps are so large that the little animal is not able to force them through the anus. The practice of administering purgatives in these cases are very dangerous, and is likely to hasten death. The trouble consists chiefly in the posterior intestines upon which the purgatives have little action; in fact the trouble may be said to be mechanical and requires mechanical rather than medicinal treatment. The finger should be thoroughly oiled (first having the nail nicely cut in order to avoid scarifying the parts), and gently forced into the rectum and the contents carefully removed. All the meconium that can be reached should thus be removed. This should be followed by an injection into the rectum of a little warm soapy water or some linseed oil. This operation should be repeated every few hours until the fæces that pass are of a yellowish color. This tells that the meconium has all passed and that the fæces which are now passing are those made by the nourishment the little fellow has taken after birth. There is slight danger of constipation after this takes place.

I consider it wise to observe the above precautions in all cases. The mare should be made as comfortable as possible after delivery. All cold drafts should be excluded. She should be given a warm bran mash shortly after delivery, and the chill should be taken off her drinking water for two or three days if the weather be cold. If any serious complications occur, in either dam or foal, veterinary assistance should at once be procured, but in ordinary cases such is not required, I think it is better that the mare should not be asked to work during the period she is nursing her foal, but if her labor be required she can do a reasonable amount of work. It is better to keep the colt in the stable while the dam is at work, and if possible avoid overheating the mare, but if such should occur she should not be allowed access to the colt until she has cooled off, as heated milk is likely to cause diarrhœa in the colt, and it often proves fatal. The colt should be taught to eat grain, choped oats especially, as early as possible, and he may be given all he will eat. At four months old or over, according to circumstances, the foal should be weaned, and he should be well cared for the first winter. He should have regular exercise and all the good food he will eat, such as good hay, a few roots and oats. I prefer chopped oats to whole, and if scalded all the better. His feet should be attended to as they are likely to grow out of shape. especially if he does not get a good deal of exercise; they should be kept in as natural a shape as possible.

If the mare is to be bred again, the time at which she should be served will admit of considerable difference of opinion. The custom of breeding on the ninth or tenth day after delivery is very common, and as it has proved successful I do not want to say too much against it. Still I do not think it is right, for while, as a rule, the mare will go to the horse then, it is almost impossible that her genital organs can have regained their normal condition, and I think it would be better to wait until the next period of œstrus, which usually occurs in about two weeks. However, the fact that the ninth day has generally proved successful may be said to justify the practice.

THE HORSE—HOW TO FEED AND DRIVE HIM.

By W. R. Swains, Valentia, Ont.

Regularity is essential to economical horse feeding. Be regular in both time and quantity. It will not do when the boys are up late at night to feed the horse two feeds and think that will do for his breakfast. Don't conclude your horse is a machine which you can lay by when you do not need him and then give him a feed of grain and expect him to do a full day's work. Feed regularly and gradually increase the quantity as the work increases, until the full ration is reached. Don't measure his grain with a shovel or an old pail; have a measure that holds the right quantity, as every one's eye does not measure the same on a shovel. See that your horse is in good health before you waste much feed on him, as it is not what he eats but what he digests that benefits him. Do not drug him unless it is a case of necessity; instead, when needed, slightly change your feed from oats to bran mash, boiled barley or a feed of roots. You can tell the condition of your horse from his coat, whether his skin is loose or tight on his ribs or whether his hair lies down smoothly and is glossy or stands up dry and harsh. Keep brood mares in a good condition by daily exercise and an occasional bran mash and a feed of roots, as the constitution of the colt depends somewhat on the health of the mother. Have a collar for every horse, not one set for all the horses, and work each horse in his own collar as the collar adjusts itself to fit the shoulder it is worked on.

Make your horse feel by your kindness that you are his friend ; do not let him regard you as an enemy. The horse is an intelligent animal and it is surprising what he can be taught by kindness. Never let your colt do its best until it is thoroughly broken and then bring him up gradually and he never knows defeat. Be gentle and have patience, for they have it all to learn. Show your approval when they make a good offer, for even a horse likes to be encouraged when he is doing his best. When I hear a man bragging of what he made or let his colt draw the first or second time he was hitched, or when I hear him say his horse has not been hitched for two weeks and he just brought him in from the pasture, gave him a feed of oats and drove him fifteen miles inside of an hour and a half, I know he is ignorant as to the proper management of his horse. You can generally tell such people's horses.

BREEDING AND CARE OF HEAVY HORSES.

By Wm. Smith, Columbus, Ont.

A year ago, when engaged with Professor Panton on Farmers' Institute work in the western part of the Province, it was almost necessary to apologise to the farmers present when advocating "Breeding and Care of Heavy Horses," even in connection with mixed farming, as the low prices for heavy horses had almost driven the farmers in these western counties out of the business ; but now this is changed, and although old time prices are not realized, still the business is on a fairly good footing, and paying prices are freely given for horses weighing from twelve hundred upwards. Perhaps in no department of farm work have farmers gone from one extreme—of breeding as many horses as possible—to the other—of breeding none at all—forgetting the fact that it takes six years before one has an animal fit to offer upon the market, until to-day buyers of heavy horses are scouring the country everywhere in a vain effort to satisfy their customers, paying according to weight and quality anywhere from $75 to $150, and in some cases a good deal more ; and now farmers are more than regretting having parted with their best mares.

In breeding heavy mares, a pure bred sire should be used, either a Clyde or Shire, although I think the best results are obtained from the use of the Clyde. The ideal aimed for should be a high one, and the following points found in a stallion should constitute an ideal one, full of character and quality, viz : A good broad jaw, not too fine muzzle, good open nostrils, full and vigorous eye, broad forehead, and the ears fairly long and active. These points will to a great extent determine temper. The head well set on the neck, which should be strong and somewhat rangy, for appearance sake ; shoulders somewhat sloping, giving the long, quick step ; a strong, broad forearm, flat broad knee, and below the knee a covering of flowing hair ; feet sound and well shaped ; a back not too long, round ribbed, chest broad and full ; hind quarters should be broad and low set, muscular thighs, fairly broad hocks, and pasterns not too straight, such as are found in the Clyde rather than the Shire. The mare should have a good many of the above points and should never weigh less than twelve hundred pounds, and as much more as possible. Brown, bay and black are the favorite colors, although it is often said a good horse can never be a bad color. By the union of such a stallion and mare as have been described, if there is any truth in the saying that "like will produce like" there can be little danger of not successfully breeding a heavy horse that will, when five years of age, command a good paying price.

The dam may be advantageously used with light work when carrying her foal, and on no account should be pampered—rather let her have the run of the barnyard. The foaling season is one of considerable anxiety, and an attendant should be on hand if at all possible. In this country and many others as well, great losses have been caused by a trouble called "colts' disease." Veterinary surgeons now know this trouble to be caused by a germ entering the navel, and causing swollen joints, and sometimes even lockjaw. Prevention is better than cure any time, and by the frequent application of diluted carbolic acid to the navel during healing this serious trouble can be prevented. The colt should be halter broken as soon as possible, thereby saving a great deal of trouble later on. The dam's nurse should be sufficient, but if an addition is necessary a little bran and ground oats will give good results. The colt should be weaned when about five months old, and should be fed some clover hay, ground oats, bran, pulped carrots or turnips and cut straw, receive water regularly and have plenty of exercise. Salt should never be forgotten. Ground flax seed, fed say three times a week, in moderate quantities, will be found a cheap medicine to all horses with perhaps the exception of mares with foal. This course will answer for winter months, until the colts is nearly three years of age, and the pasture should be sufficient for summer months, but no colt should be exposed to the late fall rains or cold weather. When coming three years old the colt should be bitted and then broke in, and used for light work during the winter months, and as the spring draws near more feed should be given and the colt is ready for its life work. Grooming and plenty of it will now pay, and great attention should be paid to both feet and legs; see that they are kept thoroughly clean. When ready to place him on the market, put him in the pink of condition, as flesh on the horse pays as well as flesh on the bullock, and no one can do this as cheaply as the farmer himself.

In breeding and caring for the heavy horse there will be some losses and disappointments, but at present prices, and with a firm belief that the heavy horse will always be required for town and city dray work, I think that mixed farming cannot be as successsully carried on as it should be unless this particular line forms a part.

MARKETING AND BREEDING HORSES.

By Charles D. Wagar, Enterprise, Ont.

The Horse Market. It is a common remark that the bottom has fallen out of the horse market, and that there is now no money in the business. While it is true that prices are low at present, it is also true that at every commercial depression during the past fifty years the price of horses has fallen, but as business revived the prices advanced. We may reasonably expect such will be the case in the years to come. One cause of low prices is an overproduction of an inferior class; the market was glutted with an unsaleable stock, entirely unfit for foreign markets. Then the demand for street car horses ceased to exist, electricity taking their place as a motive power, thus throwing thousands on the market for whatever they might happen to fetch. We find also, especially in the towns and cities, that the bicycle very materially lessened the demand for livery and carriage horses.

Let us now look at the future market prospects. In the first place the Canadian breeder is waking up to the fact that it never pays to raise an inferior animal, and that his only sure way to success is to breed from thoroughbred stock. Breeding is not a thing of chance. Like usually produces like. Although we occasionally find in mongrel breeds some very desirable animals, yet for breeding purposes they are not to be depended on. The probabilities are that they will breed back, and then you don't know what you may get.

You will also find there are but few young horses coming up for market purposes. Probably there are not one-fourth the number of colts being raised that will be required to meet the demands of the home trade alone. Besides, the export trade in horses is developing by leaps and bounds. It is estimated that last year there were about 30,000 horses exported to Great Britain from the United States and Canada alone. These were sold at an average price of $130 each, while first-class draft horses, with weight and quality, brought from $400 to $500.

Canadian horses are also in lively demand in France, Germany, Austria and other European countries. The important question is, Can we supply what they want, and how can we do so to the best advantage?

The Most Profitable Breeds. I am of the opinion that heavy draft horses, of the right sort, are in greater demand in large numbers than any other class. I know of no horse the ordinary farmer can raise more successfully than that style of animal. There is not so much risk in raising them. It seldom happens that a man who is not an expert horseman ever gets a high price for a fancy horse, either in the carriage or speeding line. He is not capable of fully developing the qualities of the animal. Anyone of ordinary ability and experience can fit a draft horse for sale. I think without doubt the Clydesdale is superior to any other breed of draft horses and finds a ready market wherever he goes. Some say they don't like them for their own use; but it is money we are after in this business, and we must consult the market.

In selecting a breeding horse we should look well to his general make up and disposition, for parents transmit to their offspring their own peculiarities.

Some Desirable Points. It may not be out of place to enumerate here some of the desirable points to be looked for in a draft horse: He must be strongly built, back short, wide across the loins, well coupled, chest deep and broad, quarter long, and heavy muscled, with muscles running down well into the legs. The legs should be free from meat, and cordy, and heavy below the knee and hock joint; the feet tough, not flat, and free from side bones. The general appearance should be symmetrical, low set, compact and weighty, running from 1,500 to 1,800 pounds.

While in Montreal I visited the Exchange stables, and met a Mr. Rystrick, of Owen Sound, who is engaged in shipping horses the whole season. He had seventeen horses, all Clydesdales, which he had sold from $225 to $375 each. These horses weighed not less than 1,800 pounds each. This goes to show what can be done if we have the proper horse in demand in foreign markets.

About Fancy Horses. For those who desire to breed fancy horses I would say there is a good demand, and high prices are being paid for stylish, high-actioned carriage horses of good size, and also for good saddle horses. These are found in the Cleveland Bay or the Hackney horse. There is, perhaps, no horse for general purposes of finer quality or more to be relied on than the Hackney. He is said to be the essence of all horses; a good carriage horse, extremely high actioned, stylish in appearance and possessing qualities of endurance not to be found in other animals.

If you want to raise valuable horses of the style we want, be careful to secure proper dams. Don't use mares for breeding purposes that are diseased, or nervous, or fretful, or undesirable in any other way. It is unreasonable to expect to get a horse worth $150 or $200 from a parent which was never considered to be worth half that amount. If you want draft horses mate draft horses. If you want carriage horses mate carriage horses. If you want scrubs mate scrubs; or let either parent be a scrub and you are almost sure of success. Whatever your ideal is get it as nearly as possible in both parents.

I will now give a few desirable points to be looked for in a good carriage horse: The high-actioned, stylish horse, of good size, is the horse mostly in demand. The head should be neat, wide between the eyes; the ears short and active; the eye prominent and intelligent; the throat clean cut; the neck round, arched and well carried over the shoulders; the shoulders oblique and muscled; the back short and well coupled; the hips round and symmetrical; the body round and ample; the chest deep and wide; the arms and thighs heavily muscled; the legs clean, cordy and free from meat; the ankle bones strong and well set, on feet of medium size, fairly deep and tough.

Fitting and Feeding. Now you have your carriage horse; take good care of him. If you don't some one else will get the profits; for no buyer wants to spend two or three weeks fitting him before he is ready for the market, and if he does he will make you pay well for it. A horse properly fitted and well trained will bring an advance in price of from $5 to $500 according to the merits of the animal. Don't consider time thrown away to groom your horse. Use brush and hand, rubbing freely, and wash him well occasionaly, for by this means you will get a clean, glossy coat, and at the same time improve his general condition. Keep the stable clean and free from foul gases. Give the horses good light and if convenient let them see one another. Use great care in watering and feeding. Always water before feeding; three pails daily is sufficient. In feeding don't overload the stomach with hay. From three to four hours daily is long enough for any horse to eat, and what he gets after that is injurious.

FALL BREEDING. In regard to the advantages of fall breeding views may differ much. I will give you a few of those that occur to me, which may be taken for what they are worth : A fall colt can be well cared for, and while with the mother will gain nicely all winter; when spring comes and the pasture gets good it will do nicely alone and thus avoid the stunt spring colts are liable to get when withdrawn from their mothers and stabled on dry feed. Then again farmers usually work their brood mares, and I think they can be worked to better advantage by raising a fall colt. Whether these advantages may counterbalance the disadvantages others must decide for themselves.

THE COW AND HER CARE.

By MRS. E. M. JONES, BROCKVILLE, ONT..

I have been requested to write this paper, and I will tell you why I respond so cheerfully to the call. When I was a child I often went with my companions to gather wild strawberries, but the berries were scarce and the search was tiresome. If a passing farmer said, "Children, I hear there are good berries in a field over yonder," we gave him doubtful belief, and we did not always go. But, if one of our number who was actually picking berries called out, "Come on, girls, here is a splendid spot," we just tumbled over one another in our anxiety to get there, and all shared in the good luck. Now, I have found "a good spot" in dairying, a *great* spot, and I want you all to come on just as fast as you can and share in *my* luck. My whole life has been spent in dairying, and, after struggling through untold difficulties, I have attained a great success and I want others to share it. I look at it this way. The scrub cow of the country will make 150 pounds of butter a year, selling at an average of 15 to 20 cents. Indeed, I doubt if they do as well as this. My cows make from 300 to 500 pounds of butter a year, which brings me 35 cents a pound the year round, right at my own dairy. Mr. Hodson wants me to tell how I raise and care for these cows and I am glad to do so because I think it will put money in your pockets, that is what we all want. I must say here that I am not a perfect instructor, because the cares of many children and grandchildren keep me so busy that I simply cannot devote all the time I should to studying out the best methods of feeding, testing, etc., though I do my best. But, do you know, I believe I have been of more use in the world just because I couldn't be perfect and do everything exactly as it ought to be done, and I will tell you why. How many farmers are there who have time and ability to carry out all the teachings of our splendid dairy schools? Not many, and I am not competent to teach that small number, I would rather learn from them myself. But there are *hundreds and thousands* of men and women, placed just as I am, that can't do all they want. Weighed down with other cares and other business, and often working at a disadvantage, we can only "read as we run," and it is this class that I want to help, because it is this class to which I belong.

If these people see a model farm and dairy with, perhaps, no end of money to keep it up, they admire it of course, but all the same they get disheartened and say, "we can never reach that—it's no use trying." But when they see a person just like themselves, full of faults, beset with difficulties, and who has *got to* make it pay or give it up—when they see such a person make a success of dairying, they take heart and say, "Well, we can do it, too." I will give you an instance. I was once sewing on the verandah when I saw a farmer and his wife walking up the drive, but they hesitated. I thought they were looking for some other place and went to meet them, when they said they wished to see the cattle, but were sorry they had come, as they guessed the place here was too fine for poor folks. "Well," I said, "I like to keep the grass cut and to have a few flowers, and the trees are lovely, but I don't think you will find anything unusual in the barn," and so we went there. They were surprised that we had no stove to warm it in winter, that the cattle wore no blankets unless going to a fair, that they were on pasture night and day, just like other cows, till it got too hot, when they stood in a shady barn during day time and ate green feed in peace and quiet ; that my winter dairy was a concrete cellar in my house and my summer one a small building in the back yard that cost but a few dollars years ago. Every question they asked was right to the point, and what they wanted to know was "How to make it pay." At last the man burst out, "Golly, Maria, ain't you glad we came, after all? Why, Mrs. Jones ain't got one thing here that we couldn't have ourselves; and if she can make it pay I guess we can do it, too." And they did. Do you know, I was never more pleased. I never felt more certain that the great value of my place and my labors as an object lesson lay in all being so plain, and simple, and homely and that everyone could do the same.

Now, in telling you how I manage my cows I don't set up to be infallible; lots of you know more than I do, but many know less, and it is to them I speak. I only want to tell them how I have made things pay, and where they can convict me of mistakes it may be of still greater use to them in telling them "How *not* to do it," as I say in my book. I have the calf taken from the dam before it attempts to drink, it is put in a box stall with a good bed and rubbed dry. Here, let me say, that we keep bulls and all young calves in a different barn from the cows, and in this building is the large box stall where the cows calve. The reason is, partly, because this building is quieter, but much more, because it is nearly of an even temperature. If you turn out thirty or forty milking cows and leave a very few young calves or a newly calved cow there, the temperature falls in a surprising way. and these animals get chilled, while in the other barn it is not so. Also, it is better for the herd to have no calving in their midst. We soon offer the calf a pint of her dam's warm milk, and this is put in a tin like a washbasin as it is lighter to hold and has no sharp upright edge like a pail to press on the calf's throat. Wet the fingers of one hand and put in the calf's mouth, with the other hand raise the basin while gently coaxing the calf's head towards it with your fingers in its mouth. Remember it is *against nature* for a calf to put its head *down* to drink, so be patient. Hold the basin well up and don't let the calf get its nostrils under the milk to choke and splutter and splash you all over, and it will soon put its head in the pail and drink itself.

When fairly started we feed our calves four quarts new milk a day, one quart at each feed, the hours are 6 a.m., 11 a m , 4 p.m. and 9 p.m. This may seem troublesome, but it is less work than to nurse a sick animal, and it gives the calf a good start that it never forgets. Soon the calf will do on three feeds a day, given at morning, noon and night, three pints of new milk at each feed. At two weeks old a little warm skim milk is added, so that the calf is soon getting six quarts a day, but still divided into three feeds, and before six weeks old our calves are fed entirely upon skim milk, of which they get nine quarts a day, three quarts at each feed. They are then getting a little early cut clover hay, which is renewed each day, and we begin to feed porridge, giving half a teacupful only, in *just one* of the daily feeds. Next day it gets a half cupful in two of its meals, then in three, and by degrees the quantity is increased till it gets half a pint or more in each feed, as it seems to need. To make this porridge I put into an empty tin (that has held two pounds of coffee) all I can grasp in one hand of *pure ground linseed meal*, not cottonseed or oil cake, but the pure ground flax seed; I fill up the can with good Scotch oatmeal, add a little salt and then stir into a pot of hard boiling water and cook as thoroughly and as carefully as if for the table. In cool weather we make it every second day, as much as needed. We *never* feed in a wooden pail—they soon sour—always in galvanized pails, and we *always* rinse each pail thoroughly immediately after use, and turn up to drain and air. In addition to this they are often scalded and occasionally all the calf pails are dropped into a big boiler in the yard and actually boiled. The great causes of scours are three things, overfeeding, irregular feeding (as to time, quantity, warmth) and dirty feeding; but the worst of the three evils is *dirty* feeding. More calves die from this cause than people imagine. Another thing is feeding: In each loose box, near the floor, is a stationary wooden button, kept out from the wall by a tiny block one-half inch thick, which is fastened on the button and between it and the wall; one moment slips the edge of the pail under this, where it is firmly held—no delay, no spilt milk—and by the time a man has got to the last of the calves he can go back and begin to gather up the pails and rinse them.

Every calf is kept separate, and every pen is thoroughly cleaned once a day, and dry bedding added. If a calf does scour it is generally in some way the fault of the feeder. Stop *all* food for a time, giving a dose of castor oil, then feed only one pint, or less, of fresh warm milk at a time, with a little lime water added. If milk still disagrees, make flax-seed tea, with a raw egg beaten up in each feed. But you will find the "ounce of prevention" much easier than the "pound of cure." After three or four months, the calf has a little ground oats and bran mixed put before him, and it will take to this by degrees and eat all it wants, but salt must be kept near it, as the porridge is now passed on to younger ones. If only nine quarts a day of skim milk can be spared, instead of heating it on the stove add hot water (not boiling) till of the desired temperature and it is a good big drink for the calf; a handful of shorts stirred in each time mixes readily with the milk and is most acceptable. No young calf is put on pasture. I have seen valuable ones turned out in a weedy lot or in an orchard, where they can get green apples, steal each others milk out of filthy wooden pails or troughs that you could smell rods away, the calves scouring and stamping, and fighting flies in the heat, and then chilled by a night rain. Then I have looked with increased satisfaction at my own calves in their cool shady boxes, and their healthy looks, bright eyes, and glossy coats more than repaid for their extra care.

Another valuable hint is this: After two or three months old, especially in hot weather, offer every calf a drink of cold water each day; even if they sometimes refuse. Try it. The first winter my calves are fed all the clover hay they want, and a little mess of pulped roots. Also bran and ground oats mixed, with a little oil meal added (not too much). I begin with a pint of this mixed feed, night and morning, and the roots at noon, and increase till they get a quart at each feed night and morning. If any older calf seems to need more, we give it an extra feed on the noonday roots. Fresh water in abundance, what salt they want, sweet corn fodder to pick over; at night, separate stalls, dry beds, and a minute or two brushing daily, and take my word for it, your calves will do you credit.

Next summer supply them with the best pasture you can give and *see them often.* The following winter, much the same treatment as before, only a larger allowance, and a little good ensilage, which I *never* feed to a calf under a year old, and if a heifer begins to take on fat, her feed is reduced. I like to have them calve at about two years, or twenty-eight months old, and the first year I aim to have them milk from calf to calf. Indeed, most of my cows do that anyway, and I never force one dry, although if I find it can be done safely, I dry her for a month. But with Jerseys, I can seldom do it; they are most persistent milkers and butter-makers. I have Grace of Belvedere, that dropped her first calf (a heifer) in July, 1897, milked splendidly all winter, and in the end of April of this year, as I found she would not go dry, I churned her cream by itself, for one week. She was then just three years old had been in milk nine months, and was due with second calf in two months, and she made just eight pounds of beautiful butter. This is the sort of cow that pays.

For three months before calving I allow a cow no grain at all, but feed her cooling bran mashes, with a little oil meal, and plenty of good hay. If on rank pasture, I move to shorter grass and near home at the last; and unless the bowels are quite loose, I give a quarter pound Epsom salts every two or three days, or oftener. Almost any cow will take this in her mash. If the udder is too full and hard, we don't hesitate to milk regularly. When about to calve we almost always gave one and a quarter pounds Epsom salts, with a little saltpetre and ground ginger. This is dissolved in boiling water and when cool is put into three beer bottles and easily given to the cow. Many use less water, but I think the dose too strong and not so effectual. The calf being taken away, the cow is given an "old country" white drink. A quart of oat meal is put in a pail and wet with cold water; then half a pail of actually boiling water is poured on, and when stirred it is frothy like cream. Then add cold water till the pail is full and drink only comfortably warm, and if your cow is all right, she won't leave a drop of it. When she is on her feet she is partially milked, but do not empty the udder at once, by any means—that is to be done by degrees. If the udder is swollen, hard and painful, rub gently and often and keep milk pretty well drawn—you won't be apt to get very much any way—and give her doses of salts and feed on low diet. Should it not improve try hot fomenting, but unless you are prepared to do this faithfully, better not attempt it. I have seen a cow bathed in water so hot, that she nearly jumped out of her skin, but soon the water got too cold ; afterwards she was just turned with the others, left out all night and finally she lost the use of half of her udder. In the first place, whatever the season, your cow should have been in a loose box for days, or or better still, for weeks before calving. Now lead her out of the box, but where no draft can reach her, and with a very large sponge or woolen cloth, foment the udder well for a half an hour at least, constantly adding to the hot water in the pail, so that it is just as hot at the last as at the first. You will then be apt to get quite a little milk ; after this oil or grease the udder to prevent cold, and return her to her comfortable box. You may need to do this four times a day, and the last thing before bedtime, but it pays. In very cold weather I tack up old blankets or split up salt sacks around the box stall nearly up to the ceiling, as nothing is so dangerous as a chill. If really needed, put a blanket on the cow also, till past the critical time. All this takes longer to tell than it does to do it, and it means hard cash to you. The man who lets a cow calve in a stanchion at night, with no one near her, and who finds a calf in the gutter, either dead or alive, in the morning, is not fit to have the care of any animal at all. For three or four days our cows get only a short allowance of hay and nothing else whatever, except all the "white drink" they will take (every alternate drink is made with bran instead of oatmeal) not a drop of cold water is allowed, no green food, and no draft till the cow is past all danger, when she gradually returns to her full feed and to the herd, although not left out at night for a couple of weeks, in case of storms.

This treatment from calfhood up may not be faultless, but it is the best I know, and the results are these : We *never* have a kicker or a vicious cow, and never remember to have had a cow lose even one teat. It is many years since I lost a cow with milk fever, and I have not lost one calf with scours in fifteen years. In feeding one must be guided by the cow's appetite and also by the way she responds to feed. *Don't get her fat*, or you are losing your money and spoiling the cow. There is one statement prevailing, which is misleading to many people, because although true, it is *not the whole truth*. They say that you can't feed richness (or fat) into a cow's milk. I will never agree to that. *Beyond a certain point*, you cannot do it, but *up to that point*, you *certainly can ;* and the dairyman's success lies largely in finding out just where that point is. It varies in different cows : some will respond much more readily than others. In my little book, "Dairying for Profit," I have given a year's feeding of a cow I once owned. The ration was very large, but *her yield was large*, so that she gave me a cash profit, in butter alone, of *$49.70 in the year, above her keep*. I have charged nothing for attendance and barn room, but neither did I credit her with the skim milk and butter milk, the large pile of manure, or the fine heifer calf she gave me. It has been said that this was an exceptional animal, and that few cows would respond as she did. *Precisely*. That just hits the nail on the head. Now, what we want to do is this, to get rid of those poor cows, that will not respond to feeding. *Beef them*, bury them, but *get rid of them*, as I have said in my book, and you will make money where you are losing it now. Some years ago I bought from a friend closing out a number of Jerseys closely related to my own. I knew them to be extra good, but they were in a starved condition, and having been obliged to buy all or none, I was overstocked and short of feed too, and I was prepared to give a bargain to an acquaintance who came to buy. I offered him a large, handsome heifer, soon to drop her first calf, for one-third of her value, but after no end of fussing he went off and bought a cheaper and poorer one. This very summer he sold a solid-colored heifer calf from that cow, eligible for registry and all right in every way, for $15 and glad to get it. My heifer dropped a fine heifer calf which I sold for $100, and that same summer tested fourteen and a quarter pounds butter a week, then made her mark as a winner at our largest fairs, and I eventually sold her for nearly four times the price Mr. Smith refused to pay. Her new owner tested seventeen cows accurately for a whole year for butter and cheese, and what is far more important weighed and charged every bit of food. Not only did the cow I sold him produce far more butter and cheese than any of the seventeen, but she made it at far less cost than any of the whole lot, except one, which made butter a small fraction cheaper, but so little of it as to be almost worthless.

My cow's test for the year was: milk, 6,702 lbs, butter, 424 lbs, showed by test, if it were made into cheese, 954 lbs., and the total food cost for the year was $37.50. These are actual facts, and I wish the record were printed and in every barn in the country. It adds to the value of this cow's record to tell you that she was not a "sport" or an accident. Her dam, which I never owned, was not tested for butter, but I saw her yield over twenty quarts of strained milk in the day. Her half-sister made fourteen pounds, five ounces of butter on her second calf, before three years old. Her granddam made over seventeen pounds a week and over twenty quarts a day and was not a day dry in years. Her granddam's sister made seventeen and a half pounds a week, milked forty-seven pounds a day, and when over thirteen years old and one hip knocked down, she made for the person who bought her from me, in less than eleven months, 340 lbs of butter on ordinary keep and milk set in shallow pans.

As I only keep half a dozen cows now and will never exhibit again, I may be pardoned if I refer to the exhibitions of '96, which was my valedictory year. I had a grand golden fawn bull, Lilium's Rioter, that took first prize at Toronto, Montreal, Ottawa and Gananoque, sweepstakes at all those places, and also headed my first prize herd at all those places. This bull was the son of one of the great cows I have named, and as closely as possible related to all the others, thus bearing out the judge's verdict in the most triumphant way. Try, therefore, to have not only one cow as good as those I have named, but all your herd as close to that mark as possible. Keep no bull except one with such a glorious array of performers in the family, not on paper but *in actual fact*, and then your success in the dairy will be equalled by that in the show ring. An expert judge is not often mistaken. Where you have true merit it is generally known. But remember that without good, sensible, unceasing care of your cattle you cannot succeed. No animal can thrive under neglect or unsuitable treatment, and no one can expect to make money in cattle who thinks that "any sort" of care and keep are good enough. You know the old saying that "No eye watches like a mother's." That is indeed true, but just next to that comes the eye of the dairyman who knows his business, and when he shuts that eye, his profit is gone.

REARING AND FEEDING CALVES FOR BREEDING PURPOSES.

By A. C. Hallman, New Dundee, Ont.

It is a common belief among many farmers and stock raisers that calves for breeding purposes require very different care and attention from that given calves which are to be used for other purposes. This is a wrong impression. There is one way only in which to make calf raising pay, whether for breeding or feeding purposes, and that way is to make the carcass worth more than the food consumed during life. The pampering of calves for breeding purposes is wrong from the start and is a very expensive method—not only expensive, it is apt to impair the calf's usefulness as a breeder. This is especially true with dairy cattle. We must consider here that we are laying the foundation in the calf for the future value and usefulness of the animal. The value of an article is largely determined by the cost of production. Systematic methods are beneficial in calf rearing. A well defined, mature plan carefully carried out always proves profitable as compared with careless, shiftless habits.

It must also be borne in mind that the calf has a mother and something should be learned about her breeding, conformation and production, whether an animal of merit or only a costly acquisition to her owner. "Blood and breed" stand for qualities which are of much service to the stock raiser. The sire is the most important factor in the herd. His pedigree should be linked with some distinguished females of deep milking strains. His points should indicate the possession of power to do credit to his breeding.

We now begin with the calf. We suppose its breeding is correct for the purpose for which we wish to raise it. We must exercise caution in selection. A puny, sickly calf is not worth taking chances with. Raise only strong, robust, likely calves of good formation. The size has not so much to do with it. The smaller calf will often make the neatest animal; however, the larger calf has that much the lead and often keeps it. If you want a calf with a large smooth body, regardless of cost, then let it suckle its own dam as long as you like, but if you expect a profit from it at two years, then it should be reared in another way. If you let a calf run with its dam for a few weeks it will cause a great disturbance at weaning time. The nervous system of the cow is entirely upset, causing a great shrinkage in milk, consequently a loss to the owner. With the calf the condition is similar. What little it gained by drawing its own supply of milk is more than lost at weaning time, which often sets it back for a week or two more. This checking of its early growth is a serious one; we must be careful at this age. The profit on an animal is often determined in its rearing. The function of the digestive organs is to get for the animal all possible good out of its food for maintenance, growth, milk or beef, and great care must be taken not to disturb them. The calf is all the better if taken away from the dam the first day; put it where she cannot see or hear it. Give it the dam's milk for the first week three times a day. The next two weeks give about all it will take in two feeds, fresh from the cow; after the third week make a gradual change from whole milk to sweet skim milk, adding scalded oil meal to substitute the cream, making the change to an entire skim milk ration about a week. Care must be taken to have the milk the right temperature—blood heat. Prepare the oil cake by scalding, adding enough hot water to give the skim milk the natural milk temperature. Use only clean vessels to feed from; feed regularly twice a day, increasing the oil cake mixture as the calf grows older. Four tablespoonfuls are sufficient for a growing calf. If the milk can be spared it will pay to feed till six months old.

It is very important to teach the calf to eat at a very early age. At a week old place a box within reach with a little meal in it. Bran is the best feed to start with as it keeps the digestive organs in a healthy condition. As the calf grows older, add a little meal, a mixture of oats and peas is very good, but always feed one-half bran. The calves can fill up on this and not affect their digestive organs. A few pulped roots or ensilage can be added to their meal as soon as they will eat this food. These foods keep their bowels in good order. Never place more before each than it will clean up before the next meal. Give the youngsters sweet clover hay to nibble at.

After the age of six months, feed on nutritious, bone and muscle forming foods. A mixture of turnips (pulped), ensilage, and cut straw or chaff, with a few quarts of meal, is quite sufficient to keep them in a healthy growing condition. If good judgment, regularity and care are exercised, with liberal feeding and watering, strict attention given to all things, I venture to say that at fifteen months old calves raised in this way will be very little, if any, behind those that suckle their dam for a long time, and are much more cheaply raised. Have your calves dropped from October till March. The early calves get the best chance; besides the dam will make more profit. Give the males for feeding purposes a good chance. They are expected to be ready for work at from twelve to fourteen months old. They must be pushed forward for early development. The heifer calves must also be kept growing to be ready for use at an early age, but can be fed on different and rougher feed.

It does not hurt a heifer calf to be of considerable girth—not pot-bellied; there is much difference between the two. They must have room for digesting bulky, coarse food. We must get them to consume a certain amount of rough food to fit their digestive organs for their future usefulness. They might not be quite so sightly in appearance when young, but all the more admired when they show their beautiful wedge shape with a large digestive capacity, so valuable and necessary to a performer at the pail. If the breeding is correct, you can generally make out of your calves what you like. Take two calves of exactly the same breeding and feed one for a dairy animal; develop her in that direction; have her to milk at from twenty-four to thirty months old. Give proper care afterwards and she will develop into a useful dairy cow. Take the other calf and force her along, let her run with her dam till she weans herself; push her right along on these lines; have her drop her first calf at three years old, and nine times out of ten she is a failure as a milker.

In conclusion I say: Get the right calf with good breeding, wean young, feed liberally, but do not fat, but for early development, and you will be satisfied with the results.

BREEDING AND FEEDING BEEF CATTLE.

By W. C. McGregor, Tilbury, Ont.

The breeding and feeding of beef cattle ought to be of interest to the farmers of this country at the present time. When corn and other coarse grains are so cheap and when the cost of transporting the products of the farm to market is such an important factor in determining the question whether we shall gain or loose on the investment of labor and capital we have in the business, the more concentrated the form of our products and the greater value per pound, the greater the distance we can afford to ship them. By converting our coarse grains and other food products of the farm into the more con-concentrated form of beef, they may be put upon the markets of the world at a fair profit, while the farmer who sells his produce at one-half cent per pound is going into bankruptcy.

In the production of beef we must first have the calf. The cows in common use in this section of the country as a rule are good enough to produce the right kind of calf if mated with a good sire of some of the beef breeds. We have Herefords, Polled Angus, and Shorthorns. Between these breeds each man must make a choice for himself. All are good, but while one may be a favorite with one farmer it may not suit another. I prefer the Shorthorn, not only on account of their general excellence, but also because of the facilities we have for breeding from animals of this breed. Good bulls are to be found in all parts of the country, and they are usually so cheap that most stock raisers can have one on his farm, and there is no excuse for using a scrub or inferior animal. The progeny from a poor sire costs as much or more to raise than the progeny from good ones, and cannot make animals fit to go into the best markets and realize the highest prices. The best time to have the calves come is from October to April, and must be well fed and cared for. There is usually more leisure to attend to them properly at this season. They should have a box-stall to run in if possible, but if this be not practicable, they should be allowed exercise every day as this will materially assist in building up a strong and vigorous constitution. By giving proper care and liberal feeding at this time, a year may often be saved in preparing the animal for market. If farmers would give more attention to their calves we would not hear of steers three and one-half years old being sold for twenty-five dollars each, as we do now.

As most feeders desire to feed more cattle than they can conveniently raise, it important to know how to buy well. Select only good, thrifty, straight steers, such as have been well cared for and kept in good growing condition, as only such will give a profit on the food consumed. Never feed a poor steer, as he will eat up the profit of two good ones. I find the best time to buy is in October or November. Let them run together for a while in pasture to get accustomed to each other, and as soon as cold, frosty nights come put them in the stable. This is a good time to dehorn them, as I thing they recover from the operation more quickly at this season than after winter has set in. I think dehorning a decided benefit to the cattle, causing them to be much more docile and tractable, and are much easier to care for during the winter season. Feed grain as soon as pasture gets short and sooner if weather gets cool, but do not feed too much at first. It is important to keep the appetite good so as to get them to eat liberally of bulky food. I have found it pay to cut and mix all the food together. I feed ensilage, oats, straw and cornstalks, and some meal, increasing the quantity of meal as they near the finishing point. Cattle should be allowed out of the stable a while every day to get water and sufficient exercise. On stormy or very cold days do not leave them out long. Always exercise great care in handling the cattle, and keep them as quiet as possible, as excitement of any kind is very injurious and will prevent them making proper progress.

I think ensilage an important adjunct in feeding, as it is not only food but also medicine, keeps the system in proper order, and enables it to assimilate a much greater proportion of the elements of food than if fed altogether on dry feed ; especially is this true if the cattle are to be finished on grass ; this plan will ensure continued growth and development. To succeed in this, as in any other department of farm work, it is necessary that there be a liking for it and a determination to do all things connected with it in a thorough manner, giving attention to every detail. At present prices of animal food products the cost of beef production I estimate at three cents per pound, live weight.

MAKING MEAT IN COMPETITION WITH THE WEST. CAN WE DO IT?

By J. S. Woodward, Lockport, N. Y.

The farmer who feeds animals to produce meat is a manufacturer. His animals are his factory ; the raw material is the forage and grain or other food supplied the animals ; his finished product, the meat which he puts into the market. In running this business successfully he must meet the same practical questions that confront the manufacturer in every other line. How to make most product of the highest quality with the smallest use of raw material and with the least expenditure of labor, is this question. The wise manufacturer selects the machine, not that will run with the least power irrespective of the work accomplished, but that will do the largest amount of work in proportion to power used. The same must be the case with the stock feeder. Of two animals standing side by side in the stable the one that eats most and makes a proportionate gain is easily the most valuable, as it will occupy no more room nor take more time in being cared for. Of course there is a great difference in breeds, in their ability to consume food and lay on flesh ; also in the meat resulting from the consumption of food. It is not our purpose now, however, to enter into the discussion of breeds but to consider what becomes of the food eaten by even the best breeds, and to ascertain how we can produce a pound of the highest priced meat for the least money.

All animals eat food for one or two purposes,—to sustain life, or make that which is equivalent to growth. The food required to sustain life—the food of support—the maintenance ration—is by far the larger part and may be all. Growth or production comes only from food eaten beyond the maintenance ration. It is evident then that the first consideration of a farmer should be what conditions govern the amount of food used as a maintenance ration and how can it be reduced to the minimum? The amount of food required for maintenance depends upon three things,—size of animals, exposure to cold, and exercise. All parts of the animal machine are continually wearing out and must be replaced by new material, which comes from its food. There is more to wear out in a large than in a small animal, and therefore the maintenance ration depends approximately upon the live weight. Were the wearing out of old and supplying of new material the only factor, it would take no more food to maintain 1,000 pounds live weight whether carried by one animal or by two, but here comes in the second factor, keeping the animal warm. Man's temperature will run about 98 degrees, but that of animals is above this. Bovines, for instance, have an average of 102 degrees, and this must be sustained no matter what degree of cold surrounds them, and this is done by the consumption of food to be burned in the body, and as radiation of heat depends largely upon the surface exposed, it follows that as the two animals will have much more surface than one animal weighing the same as both, the amount of food consumed as fuel is not wholly but only approximately in proportion to live weight. But the degree of cold to which they are exposed has very much more to do with the food used simply as fuel than the weight ; so that while under the most favorable conditions eighty per cent. of the maintenance ration is used as fuel, the animal may be exposed to such intense cold that it is unable to digest and assimilate food fast enough to supply the fuel to keep it warm, and it freezes to death. The amount of exercise taken by the animal has also much to do in determining the amount of food of support. If, of two horses standing in the stable, fed alike, one be put to hard work, its food must be increased or it at once begins to lose flesh ; its food is expended in the energy required to do the work. An ox at hard labor will require more food than the same animal being fed for the shambles. If, now, we take the feeding steer and turn him out to run about, every step taken must be supported by extra food, and the more they run the more food will be consumed without return of flesh to the feeder. Many people labor with the idea that because exercise causes the fattening animal to eat more it must be profitable. They do not realize that the animal eats more simply to compensate for the energy—food—wasted in the exercise. Exercise does not make muscle ; it only hardens it. If, therefore, we keep our animals at the least expense for the food of support, we must keep small animals, keep them in warm quarters and just as quiet as possible. Do not let anyone think that I advise the keeping of animals like the Irishman's pig, "Little, but ould," but young, thrifty animals that have not anywhere near completed growth. For beef making, those not more than sixteen to twenty months old, instead of, as is commonly done, those two, three or four, or even older.

The other use made of its food by the animal making growth is the one that is of most importance to the feeder. He must not expect that he can any longer put in a bunch of steers in the fall and feed them through the winter and have the increase of price, due to the changes of the market, give him a profit. Such was once the case, but it has now gone to the dim and misty past, never to return. In these days of lightning and cheap transportation, he who would make meat in the east at a profit, must be able to do so by a large gain in the weight of his animals. The price will usually be some better in spring than fall, but not enough to pay for the maintenance ration even, and his profit can only come from gain in weight. Many feeders, not so many as at one time, make the sad mistake of putting in a bunch of steers, perhaps well selected, and, for say three months, feeding them just enough to keep them without shrinkage, and then towards spring increasing their food to put on a gain. They lose sight of the fact that cattle require about eighteen pounds of dry matter to 1,000 pounds live weight just to live, and that the food so eaten is entirely wasted so far as gain is concerned. This way of feeding means over sixteen hundred pounds eaten for three months, from November to February, for which no return will be made. Now, suppose an increase of six pounds be made in the feed, making twenty-four pounds, a certain amount of growth would result. Suppose still six pounds more be given, making thirty pounds per 1,000 pounds, a quantity which any good feeder can readily take, it can easily be seen that double the gain would come from the larger ration, but in neither case would any of it come from the first eighteen pounds, and that by adding twenty-five per cent. (from twenty-four to thirty pounds) to the quantity of food, the gain would be increased 100 per cent. From these facts it will be plain that the sensible way to feed for meat production is to crowd the animal up to its full capacity of digestion and assimilation.

And just here comes in a principle of much importance. The younger the animal the greater its ability to digest in proportion to its live weight. Take the trouble to stand in any meat market and see customers selecting meat, and you will see that it is no longer the very fat meat that is most in demand. The lean, tender, juicy cuts are taken and the fat is cut off and thrown into the rendering basket. Careful experiments have shown that on young animals the kind of food has much influence in producing fat or lean meat, but when maturity is reached it is very costly, if not impossible, to add to the lean meat—muscle—of the animal. Start with a mature animal, no matter how poor it may be, and by no system of feeding can anything be added but fat. We may force the molecules of fat in among the fibres of the lean meat, but the amount of the muscle will not be increased to any extent. Experiments have shown another thing that is not to be overlooked. Not only can the character of the meat on the young animal be modified by the compounding of the ration, but its ability to eat and digest can by the same means be largely increased. Thus, to a steer being fed all the corn meal it can digest, may be given wheat bran, and it can not only digest it in addition to the meal, but the meal can actually be increased with good results when the bran is added. The same is true when roots or other succulent food is added to the ration.

Perhaps I can in no way convey a more clear conception of what I wish to impress than by detailing in a brief way an experiment made on my own farm. We put in a lot of fifty steers, weighing on an average 700 pounds at sixteen months old, and fed them 160 days with an average gain of 306 pounds, putting them out at 1,006 pounds. They cost us $3.35 per 100, or $23.45 each, and were sold at $5.25 per 100, or $52.82 each, which made a gross gain of $29.37. The cost of feeding, charging $1.50 per ton for silage and $8 for clover hay, and market price for all grain was 15.2 cents. each per day, or $24.32 for whole period, which left a net profit of $5.05, or nearly ten per cent. on the whole investment. In this experiment we charged nothing for care or use of buildings, nor credited anything for value of manure. This may not be a very brilliant showing, but it was made in a year of high prices for feed and gave a home market for the feed raised on the farm at the price we could have sold it for hauled to market, and enabled us to keep our men busy and keep up the fertility of the farm. On the whole it was very satisfactory. The feed used was forty pounds corn silage, two pounds clover hay, an average of ten pounds of provender composed as follows : 200 pounds corn meal, 100 pounds wheat bran, 100 pounds linseed meal, and 100 pounds cotton seed meal. Our steers were put into a warm stable and kept closely and constantly housed. As will be seen, we put into practice the very points I have been trying to show as essential to success in this business.

CATTLE FEEDING.

By J. R Snyder, Woodbridge, Ont.

The first difficulty encountered in a study of this subject is the very great range of productive capacity in different animals. Farmers are familiar with the fact that no two animals will yield exactly the same produce on the same quantity and quality of food, and they know, in a general way, that one animal may yield a very much larger percentage of profit than another, but I doubt whether the full significance of this natural difference in productiveness is generally recognized. The difficulty can only be overcome by a close observation of the animals in hand. It is an old saying, and a true one, that if we wish to succeed we require to have some definite object in view, and in our operations endeavor to attain that object. The first thing which every farmer must decide for himself is in what particular line he shall engage. There is plenty of room for choice. In this country we find some farmers engaged in sheep raising, some in hog breeding, some in dairying, some in feeding for beef, and so on, and we find men in all these lines who have been successful. Therefore, I consider the first great requisite to success depends upon ourselves, and requires that we must carry into our business the necessary skill and attention which, when properly directed, is certain to give satisfactory returns.

In the line of breeding and feeding cattle we first require to put ourselves in possession of a number of serviceable cows—cows which will not only return a profit at the pail and produce a well formed and healthy offspring, but which, when no longer required for these purposes, will possess the quality of taking on flesh easily and quickly and returning a satisfactory price when disposed of for beef. Some of the main points of such an animal are, the fine clean cut head and full mild eye, which indicates a good feeder ; top and bottom lines straight, broad, full, and deep in the chest, well sprung and deep in the rib, full in the flank, and smooth over the loin, and that general appearance which indicates smoothness generally. Apart from these features, one of the main points in a good beefing animal is what is called by feeders a good handler, (an animal with a nice soft skin covered with a fine coat of hair). Although good breeding will do a good deal, yet a judicious system of feeding will do just as much—at least that is the stand I take—and if we wish to attain the best results we must adopt such a line of feeding as will bring our animals to maturity as early as possible. Every pound of added weight put upon an animal represents so much food and is a direct cost to its owner ; in fact, whether the animal is allowed to increase, remain stationary, or decrease in weight, it is costing its owner so much every day. Therefore, the one great point which farmers should never lose sight of is the great folly of allowing young animals to lose flesh. Hence, the utter ruin which must result from the practice of allowing our young animals to run on bare pastures in the summer and around straw stacks in winter. Such a system not only retards the present growth of the animal, but makes the daily gain when the feeding period comes much less, and this is one of the reasons why many farmers have to feed their beefing cattle such heavy meal rations in the fattening period. If our young animals which are intended for beef are kept and fed properly, they should be ready for the market almost any time, and when we know that more gain in weight can be obtained from the same amount of food the younger the animal is, it is most profitable to see that our young animals get such care as will bring them to maturity as early as possible.

In outlining a system of feeding to be followed, let us start with the young calf. I like the fall or early winter calf. Take the calf away from the dam at birth ; you have less trouble in teaching it to feed, and less annoyance from the dam. Give it new milk for two weeks, three times per day ; the third week skim milk at noon ; after the third week skim milk together with a little boiled flax seed or oil cake added, and a little later on a handful of oatmeal in the milk. Have a little trough in the stall and keep a few oats and a little bran in it. You will be surprised how the calf enjoys it. When the spring growth starts so that we have grass, let the calf have some night and morning. I like to keep them in the barn the first summer ; feed well the first winter on a ration of corn ensilage, roots, and a little meal. If the young animal is well fed and properly cared for the first year of its existence, its growth and condition as a thriver is determined. It forms the habit of laying on fat, and with proper treatment we have very little trouble in keeping it in good condition after this time. During the second summer turn on grass, and if, on account of drouth or other cause there is not a supply of good pasture, this must be supplemented by some soiling crops. The following system I have found very satisfactory. A soiling crop, of course, is a little extra work, but the returns are greatly in evidence. First comes rye or peas and oats sowed early ; half of plot two weeks later. If all is not required for green crop it is harvested. Corn put in about the 1st or 24th of May will be ready when peas and oats are done, and this provides a good substitute for pasture for the milch cows and for young cattle and for those intended for beef in the fall. I have a plot of rape to turn them in in the daytime. By practising the above, cattle will come into winter quarters in good condition, and with a liberal feeding of corn, ensilage, roots, and a little meal, they can easily be made ready for the British or any other market at from two to two and a half years old. Have your feeding hours and feed then. It is surprising how readily animals will learn to know just when to expect their feed. If you are a little late they will appear restless until their food is supplied. Cleanliness and tidiness should also be in evidence. Animals should be given only what they will eat up clean, and as far as possible the same feeder should be allowed to feed the animals continually. Above all, if we desire the best results, we must accompany the food with the kindest and most humane treatment. There is no place in a cattle barn for a bad tempered man. Animals do not thrive if excited by a kick or a prod by a fork. They should be taught to regard their feeder as their best friend.

LIVE STOCK BREEDING.

By Wm. Linton, Aurora, Ont.

In breeding our domestic animals on the farm we must not take too much credit to ourselves for forming the different breeds of horses, cattle, sheep and pigs ; for although we are allowed to usurp the destinies of nature to a certain extent, we must not forget that the conditions of life under which all breeds, in modern times at any rate, have been formed, have played a considerable part in the foundation of the individual breed. For instance, the Highland cattle in Scotland, the Arabian horse, the Clydesdale horse, the

Shorthorn cattle, etc. If we look back into their early history we find that somewhat the same type of an animal existed in the neighborhood from which the present breed is supposed to have been evolved ; and again if we trace as far back as we can in the records of the different breeds of our pure bred animals, we find that all improvement in each breed was made by in-and-in breeding to a greater or less extent. Yet the men to whom we give credit for forming a breed were men of clean preceptions, hardened in their desire to excel. We presume they understood a great deal about the laws of natural selection ; if they did not and were guided alone by a fine artistic eye they arrived at the same results, but only in a different way. They also had love of animals in their hearts and were always striving to produce the best.

☞ The aim of every breeder is not only to produce an animal which shall in its own person possess the highest type of excellence sought, but one that shall have the power to transmit to its offspring those qualities of the utmost value possessed by itself. A breeder may by chance produce a superior animal, or it may be the result of carefully laid plans artfully controlling the forces of nature and subjecting them to his will. It is very hard to steadily breed to one type, and that is the test of the skill of the breeder and the value of his stock. However well the breeder may lay his plans, however desirable his stock may appear, his ability to perpetuate their desirable qualities will depend upon the potency of his animals and this potency depends, to a great extent, on how long the animals have been bred in the one direction ; or perhaps I had better put it in this way, unless the animals are related one to the other by manifold relationships they will not have a uniform type. We would not be understood to advocate close in-and-in breeding but we do want a mingling of the same blood relationships running throughout the whole herd or flock. When you commence a herd or flock, select the kind of animal you like best, let it be the Shorthorn, Ayshire, Jersey, Holstein or whatever you wish ; or if you cannot purchase a pure bred female try to buy the very best bull of the breed and if possible before you purchase him, see his sire and grand sire, also his dam and grand dam and be sure they are typical animals of the breed. Then keep right on in that direction from year to year ; never mix breed or you will never make any improvement in your herd or flock. A male animal to be able to transmit his qualities to his offspring, should always have a strong musculine head, be broad between the eyes, and have strong horns, bright clear eyes and a general appearance of a strong individuality. Such an animal will seldom fail to be a great satisfaction to his owner or to those who patronize him. We often hear breeders of fine bred stock speaking of the survival of the fittest, and very often they do not know what it really means ; so we will try to illustrate it as follows : There are in some of the large parks in England herds of the native cattle of Britain, and deer that have been confined in those parks for hundreds of years, so that you would naturally suppose that, being so confined for so long a time, and breeding in-and-in as they must inevitable do, they would become weak and degenerate. But such is not the case, for the reason that the largest, strongest buck is invariably the progenitor of the race. During the rutting season he does not allow the smaller bucks to come near the doe when in season, and the same with the cattle. Then we have the laws of natural selection among our domestic herds and flocks just as it is in the human race, and we find that strong males have an affinity for weak females and *vice versa* ; you will often see a very strong man marry a weakly woman, so that the equilibrium is preserved throughout all ages.

TUBERCULOSIS.

By D. McCrae, Guelph, Ont.

The largest and most important contribution to the literature on tuberculosis during the year is the report of the British Royal Commission. In 1896, this commission, consisting of seven well known and prominent men, was appointed with Sir Herbert S. Maxwell as chairman, to "enquire into the administrative proceedings for controlling danger to man through the use as food of the meat and milk of tuberculous animals." The Commission spent a great deal of time in hearing witnesses, the most prominent in the kingdom, the details of whose evidence take up 336 pages of a large, closely printed report, while the appendices take up 118 pages more. A committee visited Belgium, Germany and Denmark, and with the assistance of Prof. McFadyean, of Edinburgh, they went very thoroughly into the question on the continent. They say: "We desire to to submit to our colleagues the following brief report of our visit to certain places in Belgium, Germany and Denmark, and of the general impressions we received on the matter under consideration of the Royal Commission. Our attention was devoted to the following branches of enquiry:

(*a*) The elimination or control of tuberculosis in domestic animals.

(*b*) Meat inspection.

(*c*) Public abattoirs.

(*d*) Milk supply.

"Every facility was given to us, both by the British ministers and consuls in the various towns, and also by the ministers and officials of foreign states, and the kindness and hospitality with which we were received left a most grateful impression on our minds."

BELGIUM. M. Vernieuve (Chief Secretary Department of Agriculture) informed us that the Belgian Government, having in 1890 instituted a complete system of meat inspection throughout the country, resolved from the knowledge thus gained as to the prevalence of the disease, on an attempt to stamp out tuberculosis in cattle. The regulation entitled "*Mesures a'prendre combattre la tuberculose bovine*," came into force on October 30th, 1895, and deals with (first) animals within the country, (second) animals imported from abroad. The regulation provides for the very extensive use of tuberculin as a means of diagnosis of the disease by authorized persons, but, except in their hands, its use is prohibited. The only animals which need to be tested are those that are shortly to be slaughtered in the meat market. Speaking generally, it may be said that animals reacting to the test are isolated from the healthy, and only sold for the meat market, the limit of time for their slaughter being one year. Animals with clinical signs of the disease are slaughtered at once, and treated as unfit for food, in accordance with the ordinary routine methods of meat inspection. . . . This regulation has been in force for about a year, and as a result of it some 22,000 of the 1,400,000 cattle in Belgium, or 1.57 per cent., have been tested with tuberculin; of these 22,000, about 14,000, or 63.7 per cent., have reacted. It should be remembered, however, that the animals tested belonged in almost all cases to suspected herds, that is, they were tested because one or more of the animals in the shed had been found clinically affected with the disease. . . . . It may be observed that in Belgium agriculture is by far the most important industry; farmers control the elections by their votes, and it was impossible to carry an enactment involving so much destruction of live stock without liberal provision for compensation out of the national funds. The Government is not satisfied with the results of the measure, especially as regards the matter of compensation, and it has under consideration a new one to amend the present regulation. The value of tuberculin as a means of diagnosis is still recognized, but since its use as a test draws no distinction between an animal with generalized tuberculosis and another with a single tuberculous nodule, it is felt that its use for practical purposes has considerable limitations.

In addition to the cost of eliminating and slaughtering tuberculous cows within the country, the Belgian Government have incurred that of establishing quarantine stations at each place where a line of railway crosses the frontier. All cattle except those destined for immediate slaughter at Brussels are detained for three days at these stations and tested with tuberculin; those that react are returned to their consigns or slaughtered at the owner's risk. . . . . The general impression we received in Belgium was that the attempt to stamp out tuberculosis in the native dairy stock has proved too onerous to be sustained; in fact, M. Vernieuve admitted frankly that the cost was intolerable. If the internal measures against tuberculosis prove unworkable or a failure, the effect of the frontier quarantine, so far as applicable to that disease, must be regarded as superfluous and extravagant."

GERMANY. In Germany the committee were much pleased with the admirable arrangements in the public slaughter houses, which are self-supporting. "As giving some idea of the size of the slaughter houses, it may be stated that the ground covered by the slaughterhouse and cattle market in Berlin is nearly thirty acres. The slaughter houses are as a rule handsome buildings built of brick, with the floor made of asphalt, and the walls to a height of six feet rendered in smooth cement. Associated with the slaughter houses was in all cases the cattle market, and both were in direct connection with the railway lines. On the premises of the slaughterhouse are to be found also buildings for carrying out the various processes incidental to slaughtering, such as fat melting, bone boiling, gut scraping, and the extraction of albumen from blood, etc. In all the newer slaughterhouses there are large cooling rooms." Details are given of the system of inspection and of th insurance societies for having the farmer paid for meats seized. Meat that has been seized and condemned is sterilized by steam and thus cooked is sold in a market known as the Firebank at about half the usual price, and this allows poor people to buy wholesale meat at a very low price; and although much doubt was entertained at first whether it would attract customers, it was found that there is generally not enough meat on sale at the Firebank to supply all who come to buy. Speaking generally, then, it may be said that in the counties of Germany referred to the only conditions of tuberculosis leading to total seizure are: First, when the disease is generalized—that is, the whole carcass has been affected through the blood stream; and, second, when the animal is markedly wasted. In Leipzig, in 1895, 10,780 animals were found tuberculous (this number included thirteen sheep and 3,041 pigs). Of these, 9,032 were passed as of full value, 1,144 were cooked and sold, and 221 were destroyed.

DENMARK. In Denmark the slaughtering and inspection resembled Germany, and therefore need not be specially detailed. Here they met Prof. Bang, and examined carefully his methods for counteracting the spread of tuberculosis. They say about this: "The views of Prof. Bang on bovine tuberculosis are, briefly, that it is due to the ease with which the infection may spread by air, water and food, owing to the common life of healthy and unhealthy animals when in confined, badly ventilated sheds. About one-third of one per cent. of all calves born, he thinks, are affected with hereditary tuberculosis, but the great majority of calves that become tuberculous are infected through the milk. Practically, then, if calves born of tuberculous mothers are isolated from diseased animals from and after birth, and fed on boiled milk, they will escape the disease. Tuberculin, he believes, gives reliable results in over ninety per cent. of the animals tested, and in the great majority of those which react the test reveals only *latent tuberculosis.* By merely separating, therefore, the sound from the reacting animals, feeding the calves born from the first day of life on boiled milk, submitting once or twice a year the healthy animals to a fresh test, placing such as react on the other side of a partition, and purchasing only animals that have stood the tuberculin test, he believes that in a few years a healthy herd may take the place of one that has been markedly affected.

"Professor Bang conducted us to two farms in Zeeland, from twenty-five to thirty miles from Copenhagen, on which a prolonged series of experiments have been in progress.

"The first of these places, Thurebylille, is a large dairy farm on the property of Count Moltke, leased by a company or syndicate, where a numerous and beautiful herd of red Zeeland cattle is kept. The cost, however, of testing with tuberculin, isolating re-acting animals, etc., has been borne by the state, by consent of the syndicate. Nearly all the cows kept are bred on the farm, but a few animals are purchased from time to time.

"The process pursued has been as follows: All the bulls, cows and calves are kept under one roof, an extensive building stalled across its breadth, with roomy gangways before and behind each row of stalls. At the time of our visit (May 4) none of the animals had been out of the building since the preceding October, though the season was approaching when they would be turned out to pasture, day and night. It must be admitted that, in spite of its large extent and scrupulous cleanliness, the ventilation of this great byre was far from exemplary. The temperature was kept very high, probably to induce the liberal secretion of milk; the cubic space to each animal seemed insufficient (it was stated to be about 300 cubic feet per animal), and swarms of common house flies on the side of the building farthest from the entrance doors seemed to indicate that a high temperature had been maintained even throughout the winter. If this was the case on a spring morning with all the doors open, the condition of things must be very much worse in winter. The stock, however, looked exceedingly well and blooming, although, as we have said, they were all under one roof. The building was divided transversely by a movable wooden partition without a door in it. This was put up to divide those animals which did not react from those which did. Each year as the proportion of sound animals increased the partition has been moved farther on, until, at present, the reacting animals occupy the smaller portion of the building. On the night previous to our visit the sound part of the herd had been injected with tuberculin, and when we arrived, the staff, assisted by a number of school boys from the village, were taking and registering the temperatures, with the result that out of 155 cattle and calves tested, only six reacted. These would be immediately removed and put in the quarantine compartment of the house. . . The results of the treatment at Rosendal were of equal interest, although in some respects the success has not been quite so good as at Thurebylille, attributed largely by Prof. Bang to the fact that in the partition there was a door of communication between the sound and reacting sides. The routine is similar to that already described, though there are a few points of difference between the two farms worthy of remark. At Thurebylille they use the milk of their own cows only, and convert it into cheese; at Rosendal they receive the milk from other four large farms and make it into butter, sending large quantities of it to Paris, and even direct to Manchester. The cow-house at Rosendal, though similar in general design (except for the door in the partition) to that at Thurebylille is far better ventilated. The stock, however, of red Zeelands has not been bred with the same attention to beauty and quality. In both farms the milk of the reacting animals is not given to the calves, but is used in the dairy. Beyond erecting the partition the proprietors had no expense whatever, and expressed themselves as in every way satisfied with the result of the experiment.

Milk Regulations. "Up to this point we had received little information on the subject of securing human consumers against the infection by milk; or rather, all the information we received went to show that no attempt had been made to do so, further than the compulsory slaughter in Belgium of cows visibly affected by tuberculosis, and the fact that tuberculosis is included among the diseases (Royal Decree, 1894), rendering the milk from animals so affected unsaleable in Belgium. In Germany, from information supplied us by Dr. Weyl, we understand there is no general law throughout the whole empire which has for its object the supervision of milch cows, nor have the separare states passed any such law. On the other hand, there exist regulations in some Government districts which deal with the control of milch cows, but they exist only on paper, and possess no serious importance, because in the districts there are no officials who could control milch cows and dairies effectually. Tuberculosis of the udder is included in the Danish law on the Contagious Diseases of Animals (1894) as a condition rendering the milk of animals so affected unsaleable. Nevertheless, we witnessed at the Copenhagen Milk Supply Association, of which Mr. G. Busck is manager, how much can be done to secure pure milk for the community by organization, and a prescribed code of regulations for farmers contracting to supply the salesmen. All the cows from which milk is drawn (they number 4,708 on fifty farms) by this company are inspected every fortnight by veterinary surgeons, who report on the condition of the animals. The inspection is only clinical, none of the animals are subjected to the tuberculin test. We understand, however, that Mr. Busck hopes before long to have the children's milk supplied only from cows that have stood the test. The contractor binds himself to notify at once the appearance of any disease in the udder, and to withdraw any cow thus affected from his herd. Ordinary impurity is excluded from the milk by filtration through three layers of fine gravel after delivery to the company's premises. Incidentally we may remark that in Copenhagen much "pasteurized" milk, that is milk which has been raised to a temperature of 75 degrees C. before being bottled, is consumed. Tubercle bacilli, and most of the bacteri in milk, are destroyed at this temperature.

" Believing as we do that the risk to human beings, and especially to children, of tuberculous infection is far greater from milk than from meat, we regard Mr. Busck's establishment as a valuabla example of what may be done, without the aid of legislation, simply by the application of enlightened energy to management of the traffic. Of course there must be intelligent co-operation among dairy farmers, and this has been secured by the regulation insisted on by the Copenhagen Dairy Supply Company. The general conditions affecting dairy farming in Great Britain and Ireland seem to us far more favorable for the rearing of healthy stock than the more artificial method in Denmark, where the cows are closely confined in the house for eight months in each year, and when we saw how far ahead the Danes were of our people, we blushed to reflect how little use we had made of our advantages."

The foregoing extracts from the report of the members of the Commission who made the continental trip are specially interesting to Canadians. The conditions in Denmark and Canada are somewhat similar, and what has been done in the former country can be done in the latter, especially as we have a much better winter climate as far as clear, cold winter and sunshine is concerned.

DECREASE OF TUBERCULOSIS. In the report of the Royal Commission they drew special attention to the "enormous reduction in the amount of death from this cause," i. e., tuberculosis in the human family. They had giving evidence the Superintendent of Statistics, who laid before them the figures for England and Wales between 1857 and 1895. " These statistic show that during the 45 years referred to there has been a substantial and steady diminution in the mortality attributed to tuberculosis." These figures " have a special significance in view of the large increase which is known to have taken place during the last 30 years, at least, in the consumption of meat and milk per head of the population." We note with satisfaction, that death from tubercular disease, in all its forms and at all ages, has steadily fallen from 3,483 per million during 1857-60 to 2,122 during 1891-95, a diminution of 39.1 per cent. and also that at every age period for which statistics are available there has likewise been a decrease, sometimes of a very substantial character. But it must also be remembered that the rate of mortality from *tabes mesenterica* which, more than any other, represents tuberculosis in infancy, had signally failed to undergo any noteworthy diminution during the very period of sanitary progress which has been associated with such substantial diminution of death from tubercular affections at all ages in England and Wales, and that this result has coincided in point of time with a large increase in the consumption of milk." They find also that : " No really accurate and trustworthy statistical data are available as to the influence of the meat or milk of tuberculous animals when used as food for adults or for infants and young children respectively.'

THE DISEASE IN BRITISH CATTLE. " The question as to the extent to which the herds of the United Kingdom have become affected with tuberculosis is one not easy to determine. Animals perceptibly suffering from it, and betraying clinical symptons of the disease, undoubtly form a very small per centage of the whole. But of the number affected by the disease in its earlier stages it is impossible to form any opinion, owing to the absence of any satisfactory means of diagnosis other than the tuberculin test . . . Overwhelming evidence proved the greater prevalence of tuberculosis among dairy stock than among bullocks or heifers, owing no doubt to the close confinement of cows during a great part of the year, sometimes throughout the year, to their greater average age, and to the severe drain on them caused by milking. It is a common practice with cow-keepers to maintain a high temperature in the byres, which is rarely found associated with efficient ventilation . . . Such houses are often ill-ventilated, ill-lighted, ill-drained and ill-cleaned . . . Tuberculosis is almost unknown among cows which are kept chiefly in the open air."

In Glasgow between 1st. of October, 1895, and 1st of October, 1897, 1,286 carcasses were condemned for the presence of tuberculosis, viz., bulls 13, bullocks 4, calves 2, cows 1,260, pigs 7. In regard to the last item—pigs— the chief Inspector of the Veterinary Department of the Irish Privy Council said : " That he had recently formed the opinion, from his own observations owing to the slaughter for swine fever, that tuberculosis was more prevalent among swine than among cattle in Ireland."

MEANS OF DETECTING THE DISEASE. They agree that the only means of detecting the disease in a herd is the use of the "tuberculin test," and quote as follows from the evidence of Prof. McFadyean M. B., M. R. C. V. S, principal of the Royal Veterinary College: "No person, whether he be a layman or a veterinary surgeon, when summoned to look at an animal suspected of showing symptons of tuberculosis, could give an opinion that was really of such value in the great majority of cases unless he used tuberculin. We all have recognized that, within recent years. If the animal is in the very last stages of the disease one may take a diagnosis that has little chance of error, but in the great majority of cases it is only a guess. With tuberculin it is practically a certainty . . . I have the most implicit faith in tuberculin as a test for tuberculosis, when it is used on animals standing in their own premises, and undisturbed. It is not a reliable test when used on cattle in a market, or on any cattle that have been shipped, or trained or otherwise excited." The Commission report that: "We entirely accept these conclusions, and entertained no doubt as to the value of tuberculin, provided the test is applied by a competent veterinary surgeon, and that the tuberculin is of a trustworthy character. At present, it is true, the use of the tuberculin is regarded with suspicion by many farmers. The nature of bovine tuberculosis has only lately come to be understood, by means of science; any attempt to detect its presence is apt to be associated in the farmer's mind with confiscation. But when it is known that the object in view is to get rid of a destructive disease by rational methods, we cannot doubt the agriculturists as a whole, will cheerfully co-operate and accept the assistance of the state . . . We further believe that by disseminating some information as to the method of detection, and the measures to be taken for isolation, and by distributing tuberculin gratuitously, or at a low cost, tuberculosis may be considerably reduced, possibly to an extent which would prevent any serious loss of stock owners or any important interference with the cattle trade."

WORK DONE IN ONTARIO. It is very intresting to Ontario farmers to notice that this is precisely what the Agricultural Department of the Ontario Government has endeavored to do. Information has been disseminated as to the history of the disease, as to its modesof dissemination amongst man and amongst animals. It is to be regretted that little has yet been done towards obtaining reliable information on the latter subject. Prof. Bang's method has been put before the farmers in Bulletins and at many Institute meetings. Very little has yet been done in taking up any isolation scheme of this kind, and while several stock breeders wished to do so they found the provisions of the Dominion Act so drastic as to prevent the carrying out of any such plan as that of Prof. Bang. Meantime it is satisfactory to know, on the authority of the Hon. S. A. Fisher, Minister of Agriculture, that in the returns sent to this department at Ottawa, of all animals tested in Canada only about 5 per cent. have reacted. The disease, it may be concluded, is not specially prevalent in Canada while it may be and probably is widely disseminated. The great preventives to the spread of the disease are sunlight and pure air. We need more light in our cow sheds, better ventilation, and more care in keeping the stables disinfected· There seems to be little danger of the disease speading while the stock are out in pasture. In Canada as in Denmark the animals must be housed in winter. Here is the danger of spreading the disease. The cow-stables should be kept reasonably clean, cob-webs and dust swept away, and the whole of the inside thoroughly whitewashed. Good fresh lime liberally used as whitewash seems to be one of the best things for inside cleaning. For troughs and feed boxes, frequent washings with dilute carbolic acid as a disinfectant or better still, perhaps bichloride 1-2000 is recommended, but for the walls and partitions and all the interior, good lime whitewash seems to be the best. This may be applied by the use of a spray pump, and should be done thoroughly in the summer, when the cattle are all out, and as often as may be found convenient during the winter. This is strongly recommended for all cow-stables whether there be any tuberculosis feared or not. With careful cleanliness, abundance of sunlight and fresh air, danger from tuberculosis in our herds will be very slight, and where it has existed in the past may be completely stamped out by complete separation and isolation of infected animals.

TUBERCULOSIS IN ANIMALS AND ITS RELATION TO CONSUMPTION IN MAN.

By Wm. Gibb, V.S., St. Marys, Ont.

During the past eight or ten years tuberculosis, or consumption, has received more attention than any other disease of either man or animals. The reason of this has not only been that the belief of its contagious nature was becoming more generally accepted, but the discovery by experiment that the disease in man and animals were the same, and inter-communicable from one to the other. When this discovery was made, the question naturally arose how far the flesh and milk of tuberculous animals might prove injurious to man when used as food Thus, from being a medical or scientific question the subject became as of much interest and importance to the stock owner and others connected with the cattle trade, as to the sanitary medical officers and the guardians of public health.

Prior to the discovery of the bacillus by Koch, tuberculosis was supposed to be due to various causes, among which may be mentioned climatic influences, defective nutrition, exposure to hardships, over-work, excessive secretion—in fact, any and every influence calculated to produce debility. Since Koch's discovery these alleged causes have been considered as only predisposing or preparing the structures of the body for the reception of the disease-producing germs which are the true cause. Whatever may be the part played by debilitating influences in the production or progress of tuberculosis, Dr. Ransome has recently shown that, among people in communities, when such influences are general and continuous, consumption is far more prevalent than in others where such influences are not at work, and he explains that debility, induced by whatever cause, apparently renders the body more susceptible to the invasion of disease-producing organisms and likewise prepares it as a suitable soil, so to speak, for their proper growth and multiplication.

Heredity has always been looked upon as a cause of tuberculosis, but this has, as already stated, been the result of practical observation rather than of scientific inquiry. It is difficult to say in what way heredity operates as a cause of disease. It may possibly be on the generally accepted principle that like produced like, and in this case the consumptive offspring of consumptive parents is only an example of general natural law. On the other hand direct infection may occur before birth ; tubercle bacillus may be transferred from the parent to the fœtus. Professor Johne, of Dresden, found in an eight months' calf caseous nodules containing tubercle bacilli ; it has also been said that the organism may be transferred to the ovum at the time of impregnation.

In connection with the question of hereditary transmission of tubercle, breeding in and in has long been accepted as an important factor ; but that view is no longer tenable in face of the evidence which can be furnished by well known breeders of pedigree stock. Breeding in and in, so long as healthy stock are used, will never produce tuberculosis, but if tainted animals are used for the in-breeding, then the hereditary taint will be more and more intensified. Hence it is evident that the introduction of one tuberculous animal into a breeding herd may cause incalculable, and almost irreparable, mischief if not speedily discovered and the mistake corrected. Until quite recently it was generally accepted that of our domesticated animals cattle were the only victims of this disease and, therefore, the only ones from which man might become affected through the use of their flesh and milk ; but it is now known that fowls are more frequently attacked than any other animals. Experiments have shown that rabbits and guinea-pigs are also very susceptible. Pigs are not uncommonly affected, sheep and goats are occasionally attacked, and the malady now appears to be more common in the horse than was suspected only two or three years ago. Carnivorous animals are comparatively free from any tendency to tubercular infection, but although they evidently enjoy a considerable amount of immunity, still cases are not altogether unknown among dogs and cats.

It may be inferred from what has already been stated that there is in many cases great difficulty in deciding whether an animal is subject to tuberculosis or not. Animals —cattle in particular—may have tubercular deposits in their lungs and other organs and still manifest all the appearances of perfect health. Butchers are not well aware of this, and in some legal proceedings instituted recently where tubercular carcases were seized and destroyed the purchasers produced proof that they bought the cattle as sound animals, and paid a price which they would only have paid on condition or in the belief that they were healthy. They also showed that as the beasts were in fine condition they had no means of knowing that the disease existed until after slaughter, when the internal organs were examined and the carcases seized. In other cases tuberculosis is marked by well defined symptoms in its progress. These are, a cough, which may not at first attract the owner's attention until the breathing becomes altered in character and laboured. Accompanying this cough there is always a general unthrifty appearance, gradual emaciation (wasting) and an irregular, capricious appetite. There may sometimes be external manifestations of the disease visible, such as enlargement of the glands in the region of the throat, and in case of milch cows, hard nodular deposits may be, in advanced cases, found in the udder.

It has been suggested to settle the question of existence of tubercle in any particular animal while alive that the mucus from the bronchial tubes collected from the back of the throat should be examined microscopically for tubercle bacilli. Also that the milk of cows suspected should be similarly examined, more especially if any nodules could be felt in the udder. Such examinations, when they reveal the existence of the bacilli, are no doubt conclusive, but in the majority of cases the absence of the bacillus in the specimens examined cannot be taken as proof that the disease does not exist. Thus to settle the question, a post-mortem examination is absolutely necessary, and before the enquiry is completed a microscopic examination of the diseased organs may also be required.

The extent to which tuberculosis prevails among cattle in this country is unknown, as no attempt has hitherto been made to obtain reliable statistics. In large towns where there are public slaughterhouses, a record is kept of all the carcases seized and condemned as unfit for human food; but as every tuberculous carcase is not condemned the abattoir records are very imperfect even as regards the animals slaughtered there. In addition to this it must be borne in mind that in these slaughterhouses the meat is subject to inspection; and it is only such animals as look healthy that are taken there. Animals, obviously tuberculous—wasters and piners—are disposed of in private slaughterhouses, where there is no inspection either of the carcases or of the internal organs The meat, if firm and of good color, is sent into a dead meat market where it may be passed; or, if the carcass is not sufficiently good for the open market, it may be disposed of in other ways on private premises. It is, therefore, evident that in this country no reliable statistics as to the prevalence of tubercle in animals have ever been obtained

In other countries it is much the same; thus, in Victoria, when the Tuberculosis Commission sat in 1884, the discrepant statements given in evidence before them by stock owners and veterinary surgeons led them to continue their inquiry for another year, and obtain a return of all the tuberculous animals killed in the Melbourne abattoirs. Although they obtained a number of carcasses in which tubercle was found, it could not be accepted as an indication of the extent to which the disease existed among cattle throughout the colony. The statistics collected in other countries are open to the same objections. Being merely slaughterhouse records, they do not represent the condition of animals throughout the whole country.

The question has often been asked, how far and to what extent is tuberculosis contagious? Even at the present time, although the disease has been produced experimentally by inoculation, inhalation, and ingestion, many people do not believe in its contagious nature—at least not in the ordinary sense. In the case of small-pox, scarlet fever, and other transmissable disease, with a short and definite period of incubation, the date of exposure to the risk of infection is often known and remembered; but in the case of a disease like tubercle, in which the earlier symptoms are not observed, or are indifferent, and the progress very slow, the time of exposure to infection cannot be so readily fixed. Many who admit that a man can catch small-pox or scarlet fever, or an animal may take foot and mouth disease from having been in contact with patients suffering from those infections, would laught at the idea of either man or animals catching con sumption. Many cases are, however, recorded in the human subject, of consumptive patients infecting other people with whom they were in the habit of daily association. It cannot be denied that such communication is possible, but experience indicates that it does not happen very often. In consumptive hospitals, the nurses are daily and constantly exposed to the risk of infection in this way, the tubercle bacillus has been found abundantly in the air of the hospital wards; but still, it is the exception to find the nurses fall victims of this disease. It must be admitted, therefore, that the infective power of consumptive in man is very low, and unless the person exposed is predisposed either by hereditary, unhealthy surroundings, or other debilitating influences, the infection is resisted, because the organism is not introduced into a suitable soil for its growth and reproduction. Were it otherwise, consumption would no doubt have steadily increased, whereas it has of late years considerably decreased. In a similar manner the infective power of tubercule in animals is very low. Practical men consider that the affection is not readily communicable from one animal to another even when they are in close association, as in the case of cows in town dairies. It may happen that one or two animals in a herd may be affected with tuberculosis and gradually waste, until the owner either kills and buries the carcass or sells the animal to the jobber for about the value of the hide. Yet no apprehension is felt with regard to the rest of the herd, such as there would be had an animal affected with pleuro-pneumonia been brought into it. It may be argued that the stock-owner's opinion as to the infectious nature of the disease is not of much value; but it must be admitted that any man of long experience can give the results of his own observation, and the evidence of practical men generally is to the effect that tuberculosis does not spread like other contagious diseases. An examination of cattle in a herd in which a tuberculous animal has been kept for months, or even a couple of years, usually fails to detect any appearance of the disease in the animals associated with it. In cattle as well as in man the surrounding circumstances have often much to do with the extension of the disease.

The ingestion of tubercular matter by animals has proved the means of inducing the disease, and from this the question naturally arises whether the flesh or milk of all tuberculous animals should be condemned as dangerous and unfit for human food. There is great diversity of opinion on this point, for while some maintain that the flesh and milk of all such animals should be destroyed, others hold that if the leisons are localized and confined to the lungs the meat and milk may be used without danger. It is true that the deposits of tubercule are seldom found in the meat, and the feeding experiments have proved that even in the advanced stages of the malady, when the milk proved infective to guinea pigs and rabbits, the flesh in the raw state was harmless.

Meat is always cooked before being used as human food, and it has been demonstrated by Koch, Lingard and others that a boiling temperature for a few minutes is sufficient to destroy the vitality and effective power of the bacillis; but milk is generally used as food without cooking, more especially in the case of children. Tuberculous milk must therefore be looked upon as dangerous, and likely to be the means of producing the disease in young or weakly subjects consuming it. The chief difficulty in determining whether the milk of any particular cow or cows is dangerous lies in the inability of the veterinary surgeon to say whether there are any tubercular deposits in the udder. Milk can contain organisms, and even a skilled bacteriologist fail to find them; their absence in a few drops which he examines is no guarantee that they may not exist. Recent experiments in the United States have demonstrated that where tuberculous cows show no signs of the disease in the udder their milk proved infective to rabbits and guinea pigs fed with it. The results of the feeding experiments all tend to prove that the milk from tuberculous cows, if given to animals in an uncooked state, possesses a very much higher infective power than the flesh.

The question whether legislation for this disease in the Dominion is necessary, and if so, what form it should take, has recently given rise to much discussion. Legislation for tuberculosis must be considered from two different points of view. 1st. In the interest of public health, restricting or prohibiting the use of tuberculous milk as human food. 2nd. Dealing with it as a contagious disease of animals, and adopting suppressive measures to expel it from the country.

In dealing with the first part of the question it would be necessary for the Government to lay down some fixed, clear and definite code of instructions for the guidance of sanitary authorities and meat inspectors. Until, however, the members of the medical and veterinary professions hold more uniform opinions as to the passing or condemning the flesh of tuberculous animals, it is not likely that such instruction will be drawn up. In a recent trial at Glasgow, arising out of the seizure by the sanitary inspector of some carcasses of cattle affected with tubercle, medical officers of health and veterinary surgeons gave evidence and expressed directly opposite views as to whether the carcasses in question were fit for human food or not. While such conflicting opinions are held by different professional men, there can be no uniformity of action. The result would be that meat which would be condemned in one place might be passed in another, and the bulk of the doubtful-looking meat would be sent where the inspection was least rigid.

Another difficulty in obtaining uniformity of action in dealing with tuberculous meat is, that in this country we have very few public abattoirs where efficient inspection can be carried out. A large proportion of the meat is killed and dressed in private slaughter-houses and sent into large wholesale meat markets. The carcass of an animal in the earlier stages of tuberculosis would when dressed properly show no signs of the disease, and would therefore be passed as dead meat, whereas if the inspector had seen the condition of the internal organs he might have hesitated to pass it, or even condemned it.

In connection with the question of the use of tuberculous meat and milk, the United Associations of Municipal Corporations a few years ago sent out a series of questions to medical officers, soliciting replies, giving their opinions as to the infectiveness of such meat. The Association obtained very conflicting evidence. While some considered it highly dangerous, others did not, and many gave no opinion at all; but they considered it desirable that tuberculosis should be included as a contagious disease of animals, chiefly with the object of enabling sanitary authorities to deal with tuberculous cows kept in dairies for the production of milk and sold to the public.

Considerable excitement and alarm have recently been created in the meat trade by the action of some local authorities in confiscating the carcasses of animals as tuberculous and unfit for human food, where no suspicion of the disease existed while the animal was alive, and the butcher had paid a fair market price, for which he supposed he was buying a healthy animal. At the present time there is no provision by which the butcher can be recouped for such losses, and in at least two actions brought against the sellers recently, the legal decision was given the butcher on a plea that no warranty was given.

It would be an exceedingly difficult matter to arrange for compensation to the butcher in such cases. It might be argued that, as these tuberculous carcasses are condemned and destroyed in the interest of the public health, the ratepayers of the district in which they are seized should pay; but this would naturally lead to such animals or carcasses being sent to the districts in which the compensation was awarded on the most liberal terms. On the other hand it has been suggested that the seller of the animal—and that would mean the farmer or stockholder, from whose premises it had originally come—should bear a part, if not the whole, of the loss. Were this to be adopted it would imply a complete reform and reorganization of the cattle trade. In many cases it would be utterly impossible to trace the animal back to the farm from which it came. Would the farmer who had kept it and fed it, for say three months, sustains the loss, and the breeder or dealer who sold it to him escape?

On the continent—in Denmark, for example—the butchers have a kind of mutual assurance association in which every animal has to be insured before it is killed, and from which compensation, partial or total, is paid if the animal when killed is found by the inspector to be diseased. It has been suggested that something of the same kind should be done in this country, part of the fund to be supplied from the treasury.

With regard to the question of the milk from tuberculous cows, the great difficulty lies in not being able to determine with any degree of certainty whether any particular cow is tuberculous. Even if that could be settled there is the further question whether the milk contains the tubercle bacillus and is effective or not. If greater powers were conferred on health officers and sanitary inspectors in dealing with cows in dairies, more especially with such as might from their emaciated condition be suspected of being tuberculous, they would no doubt have the effect of getting rid of such animals from all dairies and cowsheds regularly and efficiently inspected. Such powers, if granted, might be exercised in a very arbitrary and very oppressive manner. While the cow-keeper in large towns would be under strict supervision as to the health of his stock, the dairy farmer in rural districts who sends his milk to town for sale many miles off would not be subject to such surveillance, unless powers were conferred on health officers where the milk is sold enabling them to enter premises in the district of other local authorities and inspect the cattle. Such powers are not likely to be granted, and even if they were, unless supplemented with powers to deal with suspected animals in the district of another local authority, they would be comparatively useless.

The difficulties in the way of legislation for tuberculosis in the living animal are sufficiently obvious to cause considerable hesitation in dealing with this side of the question. They are chiefly, as expressed in the report above referred to, the difficulty of diagnozing the existence of the disease and distinguishing it from others resembling it, and the question of compensation. In France, the only country in which it is treated as a disease of animals, there is no compulsory slaughter, and, therefore, no compensation. The tuberculous animal is isolated and placed under restrictions, so that it can only be moved to a slaughter house, and when slaughtered if the meat is considered unfit for human food it is destroyed, and the owner may utilize the skin after disinfection by the inspector.

If legislation for tuberculosis in the living animal is adopted, the orders and regulations applicable to home-bred stock would have to be strictly enforced with regard to imported animals. It has already been shown how difficult the diagnosis of the disease is, and it would be throwing an undue responsibility on inspectors in the ports where foreign animals, not subject to slaughter, are landed, where they expect to detect all cases of tubercle in the short time they have for the examination.

Under these circumstances, if legislation for tuberculosis is carried out in home-bred stock, it will be absolutely necessary to prohibit the importation of cattle except for slaughter, because the disease is known to exist in the countries from which cattle are at present imported into this country.

Until some solution is arrived at in connection with the question of tuberculous meat and milk being used as food, there seems little probability that anything will be done as regards the disease in the living animal.

JUDGING SHEEP.

By John A. Craig, Professor of Animal Husbandry, Iowa Agricultural College, Ames, Iowa.

In judging sheep it is advisable to adopt a certain definite course of procedure, so that nothing may be missed, and each motion made to disclose something in regard to the merit or demerit of a sheep. In a show ring that contains as many as ten sheep in a class it is easy to see that the judge must be quick in his work and accurate as well, and there is nothing that will contribute to both of these like examining each part of the sheep in regular order. As in judging all other classes of stock, a system of examination should be adopted and very closely adhered to. The best course to follow, perhaps, is to begin at the head. With the finger and thumb remove the lower lip so that the teeth may be seen, then with the hand under the jaw, look carefully over the head seeing that the eyes are all right, the head of good shape, no appearance of horns in those breeds that are hornless while in those with horns note that the latter spring clear from the head ; then pass to the neck, feeling with the hands the course of the neck and in that way determine the length of it, the thickness of it and the way it swells to meet the shoulder at the shoulder vein. (See Fig. 1.) Then pass dowh to the brisket, putting one hand on the floor of the chest and the other at the top of the shoulder, and in this way form an idea as to the depth of the sheep through these parts. (See Fig. 2) Then pass to the shoulder, noticing how it is covered with flesh and up to the top, also taking the girth or the spring of the ribs of the sheep (See Fig. 3) From the top of the shoulder using one hand, follow the line of the back to the end of the body. (See Fig. 4.) By carefully handling these parts the fleshiness of the sheep or the way the ribs are covered and the straightness of

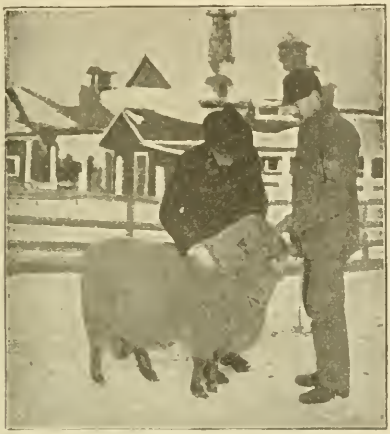


Fig. 1 Looking at the face and head and feeling the fulness of the neck.

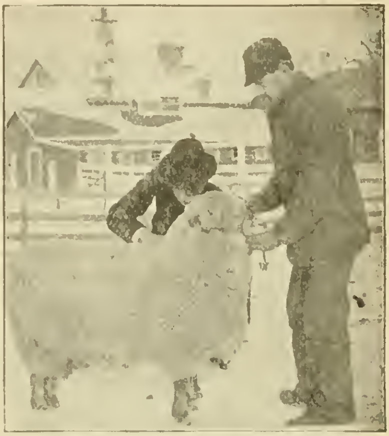


Fig. 2. With one hand on top and other below estimate the depth of chest.

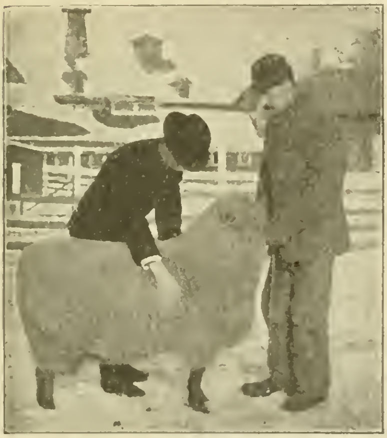


Fig. 3. Notice the heart girth by the distance between the hands.

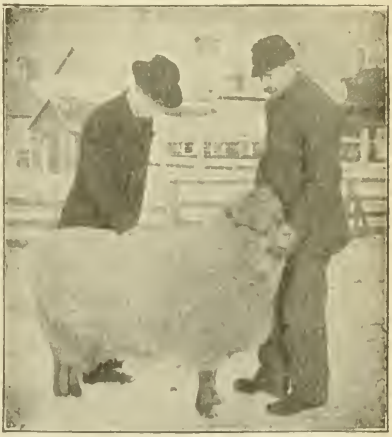


Fig. 4. With the hand perfectly flat note the levelness of the back, its firmness and covering.

the back are determined, and at the same time the spring of the ribs is made apparent. The width of the loin should then be taken, and the covering and the thickness of it should also be noticed. (See Fig. 5.) The width at the hips should then be observed and turning to one side and using the two hands the length from the hip to the end of the hindquarter should be made apparent between the two hands. (See Fig. 6) Then the way the hindquarter is carried back and the fulness should also be examiued. (See Fig. 7.) Following down towards the leg, the development of the thigh on the outside requires examination. (See Fig 8) And then with the hand the quarters or the twist between the legs should bo firmly felt.

Deception in Form Due to Trimming. In this way the sheep has been thoroughly examined as to form, but it is to be remembered that the hand should be thoroughly relied on to detect all discrepancies in form, and unless the sheep is carefully handled the examiner is very likely to be deceived. The wool of all show sheep and fat stock as well in the ring is always trimmed and the trimmer possessing skill can make a sheep of any desired form, providing the wool is long enough and the sheep approaches somewhat towards the form which is being imitated.

JUDGING FAT SHEEP.

Feeding Type Desirable for a Lamb. As the market has been for some years past, and as it is now, the type of a lamb that sells best, that is, has the quickest sale at the highest price per pound, is the one that finishes fat at about one hundred pounds live weight. The feeder to get the best and most profitable gains from the lambs that he feeds must not only choose a type that meets the demands of the market, but he also must select that kind of lamb that has the most thrift and the most vigor. It is the low set thick type that possesses these qualities to the highest degree. Shallow chested lambs that stand high on their legs and are much cut up in the flank are likely to be ill-doers.

Wheat, Early Maturity and Market Requirements. To secure the greatest profit in feeding, it is desirable to have the gain made as rapidly as possible. The younger the animal, the cheaper the cost of gain, as a rule, and it is that feature that makes early maturity such an important consideration in the different classes of stock. In the matter of weight the market favors a lamb that is from eighty to one hundred pounds live weight, because of the fact that those at that weight usually dress better and the cuts are smaller.

Condition—Relation to Weight. It is not only desirable that a lamb should be of this weight, but it is even more so that the condition of the lamb should also be satisfactory. The lamb should be fat at that weight to sell to the best advantage. The body should be evenly covered with firm flesh and not patchy.

Value of the Butcher's Cuts. The different parts of the lamb from the butcher's standpoint shows a wide variation. The neck has a value of only one cent per pound, the shoulder two cents and the shanks the same. The rib running from the point of the shoulder to the loin has a value of nine cents per pound and the same is true of the loin, while the leg of mutton, or the "gigots", as they are sometimes called, have the highest value per pound of any other part, as they are quoted at ten cents. The breast, however, has the low value of two cents per pounds in Chicago markets. From these facts it will be seen that the back and the development of the leg are the most important points to criticise in the form of the fat lamb.

Prof. Curtiss found in a lot of ten pure bred Oxford lambs marketed by the Iowa Experiment Station, April 3, 1896, the leg-cuts constituted 31.87 per cent. of the whole carcass by weight, and sold for 42.63 per cent. of the total value. The leg, rib and loin cuts together aggregated 73.74 per cent. of the total weight and sold for 92 per cent. of the total value. On the back or about the tail head, sometimes in lambs that have not put on flesh evenly, there are dents or rolls of flesh on the rib, as it may have rolled from the back to the fore flank. This is more frequently seen in the instance of old sheep that has been fitted for show a number of times. As indication as to whether a lamb is ripe or not—that is, in prime condition for the butcher—the fulness of the cod and the flank are the most generally accepted, while the thickness of the neck and the condition of the tail head are also considered by some to be of value.

Defects of Form. In what has preceded, attention has been given particularly to the perfections, but there are many defects worthy of being mentioned that are characteristics of fat lambs. Very often the top of the shoulder is not covered sufficiently with flesh, letting the top of the blade come out too sharp and bare. This part for at least the length of the hand should be flat and well covered with flesh in a fatted sheep. The ribs should spring out from the body and all well covered with firm flesh. The backbone should not stand prominent at any point, as it sometimes is at various points along the back. Frequently it is grooved on account of the development of flesh along it, but it is better to be perfectly flat and smooth. The loin in some lambs rises, and this is specially a bad defect when it is also bare of flesh. The hind quarters frequently shrink away towards the tail head and down the thigh. This should not be, as the hind quarters should continue straight and full. From the hip to the hock the fat sheep should be especially strong. Not only should the leg be full and plump with muscle on the outside, but between the legs in the twist the flesh should run down well towards the hock and compel the hind legs to stand wide apart. Badly set hocks often interfere with the development of the hindquarter, and they also are as bad an eye-sore as broken down pasterns.

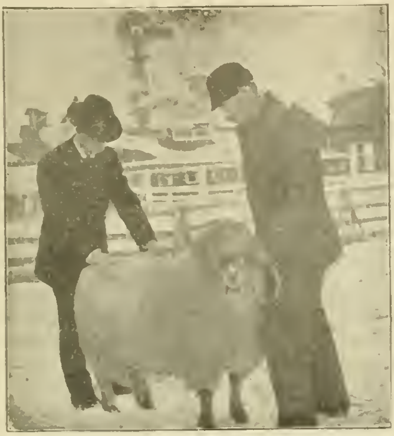


Fig. 5. Taking the width of the loin ; also note thickness.

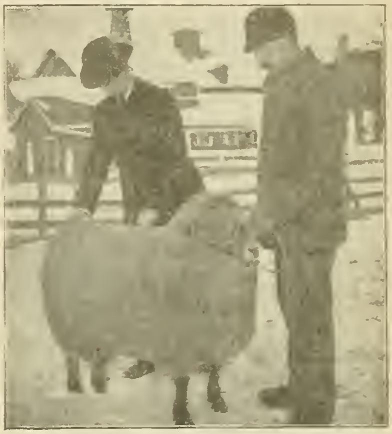


Fig. 6. With one hand at the hip joint and the other at the end of the body, the length of the hindquarter may be estimated.

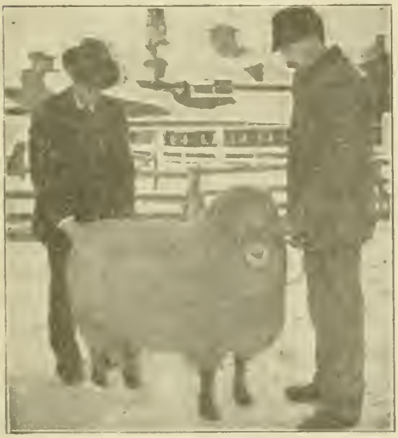


Fig. 7. Noting the degree to which the width of body is carried to the end.

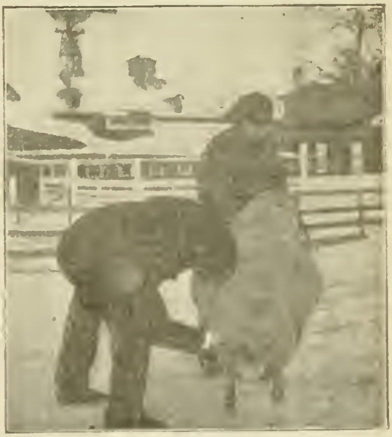


Fig. 8. Feeling the development in the leg of mutton or gigot.

Quality. After the form of the sheep has been carefully gone over the quality should be noted. The cleanness of the bone, the apparent strength of it, and the nature of the hair which covers the face and legs should be noted. These are important features in either breeding sheep or fat sheep. It is, perhaps, most valuable from the butcher's standpoint because the waste is less from a sheep of good quality than it is from one that is inferior, but sheep of the best quality will not dress much over fifty per cent. of their live weight.

Examining the Fleece. In examining the fleece, the chief points to consider are the quantity, quality and condition. The best way of arriving at an estimation of the nature of the fleece is to open it first just over the shoulder. It is in this region that the finest and best wool of the fleece is to be found. By using the hands in a flat position instead of sticking the fingers into the wool, the fleece may be parted in a nicer way. (See Fig. 9). After looking at the wool and skin in this region the thigh should be chosen for the next examination. (See Fig 10). This part usually grows the poorest and coarsest wool of the whole fleece. Then the covering of fleece on the belly is also noticed. By examining the fleece in these three parts a fair estimate may be made of its qualities.

Quantity of Fleece. The chief factors which determine the quantity are the length, density and evenness of both of these over all parts.

Density. The density of a fleece means the clearness of the fibres. Technically, it means the number of fibres that grow on a square inch. Density is not only of value to secure a heavy fleece, but from a breeder's point of view its chief importance lies in the fact that it is more protection to the sheep than a fleece that is open. Not only is a sheep with a loose, open fleece more liable to contract a cold from exposure to rain or wind, but it is also more apt to yield a dirty fleece, as the loose fleece catches the dirt and dust and pieces of hay and straw. From the shepherd's point of view, the denseness of the fleece is its leading feature, for it will be found that those animals with dense, close fleeces are less subject to such diseases as catarrah, running at the nose or scouring. When a sheep experiences a chill, it at once affects the circulation and sends the blood to the internal organs and shows inflammation, or scouring begins. This is why sheep that have open fleeces are more subject to such diseases than those that have dense fleeces. Wool is one of the best non-conductors of heat that we have, and when it is on sheep in the form of a dense fleece it gives them the greatest possible protection from exposure.

Furthermore, if the fibre is not dense in the fleece, it is almost impossible for it to be sound,—that is, free from weak spots. When a sheep has been badly chilled or has become sick in any way so as to cause the pores of the skin to contract, a break or shrinkage occurs in the fibre at that point. The wool on a sheep grows from a small sack in the skin and it passes away from the skin through a small opening which may be easily contracted or expanded according to different influences. The influences are various, and for that reason it is important that the sheep be covered with a fleece that is so dense as not to be affected much by external conditions.

Length of Staple. The length of the staple is an important feature, both from a commercial point of view and from the shepherd's standpoint. Wools are generally known as short staples—the carding wools, which are used for woollen cloths; or long stapled or combing wools, which are used for worsted clothes. The long stapled wools include the Lincoln, Leicester, Cotswold, Romney Marsh, and Black Face or Highland. The short staples include that of all the Downs—Southdown, Hampshire, Oxford, Cheviot and the Welsh. The basis of this classification is plain, and the reasons for it are readily understood. The manufacturer of wools desires a short stapled wool, for such a wool has better felting qualities and usually more serrations or spirals than the long wools. The idea in this work is to produce the yarn in which the fibres are transversely disposed to the axis or length of the thread. In yarns of this nature this feature is termed "pile." The points projecting from the centre should be numerous, so that in felting the fabric unites, and also when the cloth comes to be finished it will appear on top like fine short fur. (R. A. S., Vol. II., 2nd series.)

On the other hand, in worsted goods, the object is to stretch the fibres and lay them parallel with each other, and this produces a yarn, even, strong and composed ot as fine fibres as possible. In this process of manufacture, it is easy to see that the length and strength of a fibre includes its most valuable characteristics.

Classification of Wool. There is another market classification which is more definite than this, but is very similar in nature. The wools, according to their length and strength in the Chicago market, are divided into clothing, which is short, being about two inches, or it is weak; then there is the Delaine class, which is a fine wool from two to three inches long in fibre. The other class is the combing, which is a strong wool over three inches long. This classification, it will be seen, depends altogether on the length and strength of the wool. Considering first clothing wool, which is used for making flannels and certain kinds of rough cloth, shortness in the fibre is its leading characteristic. If the fibre of a fleece, however, is four inches long, it would on its length be classified as combing wool, but if that fibre has a weak spot in it where it readily breaks, it passes from the combing class into the clothing class and drops two or more cents per pound in price. The Delaine wools are fine wools that are not longer than three inches. They are used for making the finest kinds of cloth. The combing wool must in the first place be strong to stand the process of combing, and with that the greatest length is desired.

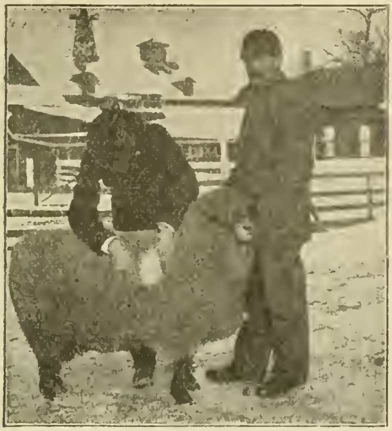


Fig. 9.—Manner and place of opening the fleece to see the finest quality of wool.

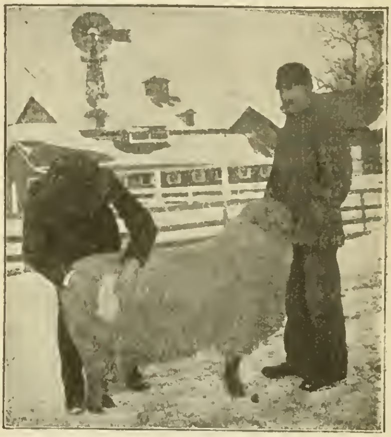


Fig. 10.—Manner and place of opening the fleece to see the poorest quality of wool.

In further reference to the quantity of wool, in examining a fleece it should be noticed that the length and the density are even over all parts. Considering first the length, the fleece should be examined at the brisket, on top of the back, along the side on the thigh and on the belly. As a rule sheep fitted for show are trimmed in such a way that the wool in front of the brisket is much longer than that on top of the back, and the same may be said of that on the sides. In an untrimmed sheep, however, on which the wool has grown naturally, it will be found that there is a natural variation in the length of the fibre on different parts of the body. The wool on the brisket will invariably be found to be longer than that on the top or in most other parts. The density of the fleece may be determined by the feel of it under the hand. If the fleece feels firm and it seems to be compact, it is likely dense.

Quality of Fleece. As in most other instances, it is rare to find quality and quantity associated. As a general rule it will be found that the short wooled sheep have the finest quality of wool. In judging of the quality, it should be noted again that the finest wool occurs just over the heart and on the belly, while the coarsest grows on the thigh.

Softness. By pressing the fleece with the hand the softness of it can readily be approximated. This feature is opposed to harshness. The softness of the fleece not only depends greatly on the management, but also on the nature of the food and the soil. In reference to the foods, those that are rich in sulphur have been observed to have the most influence on the softness of the wool. It is interesting to know that in one hundred pounds of wool there is at least five pounds of sulphur, and it seems that the abundance of this in the food has an effect on this feature of softness in the fleece. It is well known that soil has a strong influence on the properties of wool, especially in regard to its softness. Clay soils are considered to produce the softest wool, of the best lustre, and next to those rank sandy soils, and lastly those of the nature of limestone. Chalky soils have been noted for the deterioration they produce in the softness of wool. Harshness of the fleece is generally due to an absence of yolk which has resulted from ill-health on the part of the sheep, or from exposure. If you will consider the nature of the fibre of wool, it is easy to understand how anything, such as ill-health or exposure which affects the secretion of yolk, is certain to make the wool harsh. A fibre of wool harsh. A fibre of wool is covered with a series of scales which overlap in a similar manner to the shingles on a roof. When the secretion of yolk is abundant, these scales fit it closely to the fibre, but when the secretion of yolk is stopped from any unnatural cause the scales stand out from the fibre very similar to warped shingles on a roof. The result of this is that the fibres lock, and when you feel the fleece that has fibres of this nature they seem to grate each other very similarly to file shavings. The wool is harsh and dry, and when pressed it gives that grating feeling which is also characteristic of an unhealthy fleece. It is this that produces what is generally known as a cotted fleece.

Commercial Grades. According to the fineness of fibre, or, in other words, the size of it, wool is arranged in three grades—fine, medium and coarse. These terms are applied to all the classes of wool—the clothing, Delaine and combing that go into the market. For instance, there is fine clothing, there is coarse clothing; there is fine Delaine and medium Delaine; there are all three grades of combing wools. These terms relating to the grades are used to designate certain size of fibre. No exact measurement limits the arrangement of it, but yet they are so defined that one can readily tell them after becoming acquainted with them in practice.

Crimp. All wool is more or less crimped, known also as spirals. The most important point in regard to the crimp is that it should be regular and the folds should not be thrown on each other. Regularity in the crimp indicates that the fibre is sound from end to end, but if in some places the crimp is short and close, and in others long and wavy it indicates that where this difference occurs, there is an unsound spot in the fibre. It shows that the growth has been irregular and there is a close relation between the fineness of the fibre and the nature of the crimp. Where the crimp is fine and close almost invariably the fibre will be found to be of fine quality. In all coarse wool it will be noted that the crimp is open and wavy. In opening a fleece and looking at it, the crimp should always be noted, from which an accurate estimation may be made both as to the soundness and the fineness of it.

Soundness. The soundness of the fibre is of much importance in the process of manufacturing woolens. The fleece of unsound fibres will bring four to five cents less than one that is strong throughout. To test the soundness of a fibre in addition to knowing it by the character of the crimp, if a small lock of wool is taken between the fingers and stretched evenly and gently, the unsoundness becomes apparent. The wool may break at the bottom, having what is called weak bottom, or it may have weak middles or weak tops, according to the location of the unsoundness.

Evenness of all these characteristics should exist over all parts of the fleece. The softness should be over all regions, and fineness also; some crimp should in addition appear in various parts, and the soundness should be the same throughout. This gives a fleece an evenness in quality which is greatly desired.

Condition. The condition of the fleece refers to its purity, lustre, brightness and the quantity of yolk and the character which it contains. The condition of a fleece results mostly from correct breeding and proper management.

Purity. Purity refers to the freedom of the fleece from dead fibres and foreign matter. In fleeces that are grown on sheep that are exposed to hard conditions there is a natural tendency for the fleece to revert to its original condition,—that is, fibres of hair begin to appear in it and those take the place of the wool. Very often in fleeces grown by sheep that have been exposed there will be found a great many dead fibres which are technically spoken of as kemp. These dead fibres are very injurious to the fleece from the commercial standpoint, because they do not absorb dyes, and in any cloth that is made from such wool these dead fibres all retain the white and hard appearance that they had in the fleece.

Domestic Wool. Based on the condition of the fleece the market makes a division of four kinds. These are what are known as domestic wool, territory wool, blanket and carpet wool. Domestic wools are clean and bright. Wool of this kind comes from fleeces that have grown under what might be termed domesticated conditions,—that is, sheep are given shelter, fed well and otherwise have good management. This results in a clean, bright wool which the market classifies as domestic wool.

Territory Wool. In contrast to this is the territory wool. This wool is called territory wool simply because it is dirty or it is discolored. It is the wool that comes from sheep managed and cared for in a way very similar to that which is common in the territories. The sheep have run out the year round ; the fleece has become full of sand, straw, chaff, etc., and this has filled the fleece with foreign material.

Blanket Wool. The poorest kinds of wool that go to the market are known as carpet wool and blanket wool. The worst feature connected with this kind of wool is the presence of kemp or the dead fibres to which I have referred. On account of these not absorbing the dyes, this wool has to be manufactured into carpets and blankets. When we understand the nature of the fleece of the original sheep, and see the improvement that has been made through breeding for a number of years, we can easily see that when sheep are neglected the tendency is for their fleece to revert to the original condition. In this condition the fleece was made up of an external covering of hairs and beneath it an undergrowth of very finely fibred wool. Domestication by man has completely removed the hair, and given us a fine fleece of wool which exists on well bred sheep to-day. Neglect on the part of the breeder will surely result in the sheep reverting to the kind of fleece that it at one time possessed.

Lustre. This refers to the glistening appearance of the fibre when held to the light. This is independent of the amount of yolk, and it is also quite distinct from the brightness of the fibre. Although yolk in a fleece may add to the lustre of the fibre, yet all lustrous wools have this characteristic independent of the amount of yolk that is present. The chief advantage from a commercial standpoint that attaches itself to lustrous wools is that they more readily take the delicate dyes. Wools in the market are known as lustrous or dull, according to the appearance of the fibre. The lustrous fibre has the appearance of having been varnished, while a dull one does not show the least tendency to glisten when held in the light.

Brightness. Brightness is quite distinct from lustre, as it refers to the color of the wool. In the market wools are said to be bright or dark as they vary in this characteristic. The bright wool is one that has a clear white color, while the dark wool is one that has become discolored from the soil on which the sheep have ranged, or it may be through pasturing them among burnt stumps. Brightness is always a characteristic of domestic wool, and discoloration is a feature of all territory wools.

Yolk. This is the grease or oil that is naturally secreted by the skin. As before indicated the yolk in the fleece is an indication of the healthiness of the sheep. The yolk is secreted in the skin, but it passes down through the fibre and finds an outlet at the end of the fibre. If you will notice sheep on certain days when the weather is close and the sheep are likely sweating, the yolk seems to accumulate on the end of the fibre, and if you were to run your hand over the fleece at that time you would find it became quite oily. The yolk comes out at the ends of the fibres mostly and works back into the fleece. In some flocks the quantity of yolk has been increased and encouraged in selection in heading in every way so that heavy fleeces might be obtained. The ordinary fleece in which yolk is abundant in proper quantities will lose nearly one-third through washing it in hot water. This grease is of no value to the manufacturer, and it represents a direct loss to him when it is in the fleece in too large quantities. The feeding and the management undoubtedly influence the amount of yolk. Feeding sheep foods that are rich in oil seems to further the secretion of grease, and especially in feeding with such rations as are generally given to fattening sheep the quantity of yolk seems to increase. In our work in fattening lambs, we have found that those which receive grain from birth invariably sheared heavier fleeces than those that had grain only during the last three months of fattening. By washing samples from the fleeces of those sheep, we found that the increased weight of the fleece was most altogether due to the increased amount of yolk which the grain-fed lambs secreted. The presence of yolk in proper quantities is of chief importance, because the fleece becomes soft through it. It is made more compact. Its condition remains bright and clean, and further it is a safe index of the thriftiness of the animal.

JUDGING SHEEP FOR BREEDING PURPOSES.

In judging pure bred sheep in the breeding classes, the subject of breed type should receive careful consideration. While it has a bearing on the judging of all kinds of pure bred stock, yet it is of double importance in the pure bred classes of sheep.

Formation of types. The type that has become characteristic of each breed has arisen from a variety of causes. In all instances the breeder's skill in selecting and mating has been a controlling factor, while other influences have more or less assisted. In some instances the function of the animal, or the work it is called upon to do, has had a strong influence. This is evident in the instance of the running horse, the trotting horse and the dairy cow, where the form or the type has developed from the function. In other instances the environment has aided man in his work of selection, and this is notably true of sheep. The adaptability of sheep for different altitudes of land enables us to divide them into lowland breeds, upland or down breeds, and mountain breeds, is connected with the subject of breed type, for the environment of such lands develops the type that does the best upon them. The lowland breeds are large, square and strong-framed, and heavy producers of wool and mutton; the down breeds are smaller, but rounder and more compact with fleece, frame and mutton of better quality. The mountain breeds must have more vigor and agility than those previously mentioned to earn subsistance under rougher conditions, so that the possession of a rugged constitution, active disposition with strong limbs and muscles are of more importance than the other features that are characteristic of other types. Man seeks to fix the type that he has found characteristic of the breeds by elaborating scales of points representing the features of the types desired and towards the production of those ideal types all the breeders bend their energies.

Value of breed type. The type of the breed having been decided upon by all the breeders, it should be the aim of the judge to recognize it, for, aside from any acknowledgment of the wishes of the breeders, it is a point of direct value to do so. When a breed has been bred uniformly to a type for a period of twenty years or so the type has become so fixed that it is uniformly transmitted. Two of the most powerful factors aiding the fixing of the type of a breed are the breeders seeking to produce the animal of ideal type as represented by the scale of points, and the judges conforming to it in the show ring. The result is of value to the breeding interests, as it assists in making the breed prepotent or able to transmit its characteristics with a greater degree of certainty

Another feature associated with the fixing of the breed type by the assistance of the breeder and the judge is the fact that it then becomes possible to select breeding stock from among the pure breeds with special reference to their adaptability for given environment. Knowing the environment that has assisted in producing a type of any breed of sheep, and knowing that a certain type has become the fixed property of that breed and no other, it is possible to make an intelligent choice of a breed for any environment. It is this adaptability for different environments that has given us over twenty-five different breeds of sheep, and as it is the possession of a certain type, which is called breed type, that gives each a place, it is consequently important that the breeder should try to retain the type and in this secure the co operation of the judge.

The Ram. Aside from the breed type, which is outlined in the scales of points that are given elsewhere, the ram in type should show masculinity in many features. In those breeds that have horns, the latter should spring strong from the head and turn clear from the face. In all rams the face should be broad between the eyes somewhat short with a Roman nose. The crest or scrag should be thick and rising and the neck full. A point deserving emphasis is the depth of the chest. The body should sink deep between the forelegs, and the ribs back of the shoulder should be deep and round, making the girth large and the brisket prominent and wide, two features that are indicative of a strong constitution. A live fleece, that is, one that is springy and not dead to the touch, and especially a dense thick covering of belly wool is also indicative of vigor or constitution. For the same reason, in those breeds that are wooled about the head, the more complete and dense this covering is, the better it is liked. The legs of the ram should be straight and strong and short. In movement the ram should be bold and active. This is often influenced by the condition. A ram should never be so heavy in flesh as to be useless for service, as is too often the case in the show ring. The flesh should be even and firm, and not gathered in masses or rolls at any part of the body. It is very apt to gather at the fore flank, leaving the back bare or raw. Excessive condition is likely to make the ram unwieldy in action or result in broken down pasterns which usually render a ram useless for breeding purposes.

The Ewe. The ewe should be rather long in the face with fine features. The neck should be slender and without any of the thickness noticeable in the ram. The body should be deep, round ribbed and specially long so as to provide room for the growing lamb. The type of the good milking ewe verges strongly towards that which is typical of the good dairy cow. The ewe that milks well, and, consequently, rears early maturing lambs, tends towards the wedge shade, deep in the chest, large bodied and wide across the loins and the hips. The condition of the ewe should not be such as to impair her breeding qualities. Excessive fatness as a rule is in this way injurious. The flesh should be evenly distributed and not gathered in bunches about the tail head, and it should be firm and not flabby.

Judging Lambs and Flocks. In judging lambs, the main consideration is to make due allowance for the difference in age among the contestants. As to the possibilities of future development, the judge can only have his own experience and observation to guide him. It may be said, however, that it will be found as a rule that the short, smooth and thick lamb, which shows best at five or six months old or under, will rarely develop into a sheep of desirable size when mature; while the lamb that is more growthy, yet possessing a well knit frame, showing some length and also quality, will develop both size and smoothness. Stress should be laid on the strength, straightness and firmness of the back and the depth of the body.

In judging flocks the rams that head them should receive chief consideration, though this does not mean that the uniformity and the type of the ewes should be overlooked. An exceptionally good ram either in the showing or in use as a sire will as a rule wipe out a multitude of small faults in the remainder of the flock. In reference to the ages of the individuals in the flock, the nearer they are to being yearlings, the higher they should be appraised. Younger than this calls for suppositions relating to their development, and when they pass beyond two years, their worth in the flock has lost the value that results from the production of one year, though it cannot be said that the merit of the sheep has decreased in any other respect.

SHEEP ON THE FARM.

By D. G. Hanmer, Burford, Ont.

In this day of progress the value of sheep on the farm is by many, perhaps, not fully understood. Sheep on the farm have a value in making the land more productive and profitable, with less labor and expenditure, than any other domestic animal. During the grazing season their droppings are more evenly distributed over the fields than that of any other animal, and by keeping their yards and sheds thoroughly well littered a large quantity of the best fertilizing material can be obtained. To stock a farm with sheep, does not require a large amount of money, and the risk is small, for sheep, if well managed, will seldom die in their owner's debt. Again, sheep are excellent weed exterminators and they eat with a relish many varieties of weeds other animals will not touch.

Which is the most profitable breed to keep is a question often asked. If properly cared for there is money in any breed. Having made a choice of the breed, fix in your mind a standard of excellence; make it high, and endeavor to bring each individual of the flock up to that standard. To do this the greatest care and judgment should be used in the selection of a ram, as much of the future of the flock will depend on the impression he leaves. Never use an inferior ram, no matter at what price he can be bought.

While improvements in the flock can be hastened by proper selection in breeding improved breeding can never make up for poor feeding. Much improvement can be brought about by liberal and skilful feeding of the lambs until one year old. I once heard a breeder of short horn cattle say, that the great secret of making a good beast was never to allow the calf flesh to go off. The lamb flock should never be reduced to a scanty ration, even for a short time. No flock owner can afford to economize in the food of his lambs; trying to save on their necessary food is reckless waste. No animal will grow more rapidly, and the per cent. of gain for food consumed is probably higher than that of any other animal kept on the farm.

I do not advocate keeping sheep on the farm to the exclusion of all other animals, but I have no hesitation in saying the sheep industry in Ontario may easily be doubled without seriously encroaching on other lines of production; and this may be done with little further outlay than the actual investment required to procure the foundation stock. It rests with the farmer to determine whether he will reap an ungathered harvest from this source or continue to mourn a diminished revenue that will always be the inevitable result of grain growing in Ontario for purposes of sale.

SHEEP BREEDING AND THE CARE OF SHEEP.

By Valentine Ficht, Oriel, Ont.

There is no branch of agriculture that is of more importance to the farmers of Ontario than that of sheep raising, and there is none that brings more profit for the money and labor expended. Yet there are so few farmers that keep any sheep at all, and those who do keep any have either half breeds or worse. These live around the straw stack in the winter and pasture in the bush in the summer, and then when fall comes they have a few little lambs to sell for which they will receive a couple of dollars a head. No wonder they say, "There is no profit in keeping sheep." Give sheep half a chance and they will live where other animals will starve, but to get any profit from raising them, they must have a little better care than bush pasture and the straw stack. Some one says, "If we all raise sheep there will soon be so many that we will not be able to find a market for them." There is no danger of that; if every hundred acre farmer in Ontario kept twenty pure bred ewes, there would be a greater demand and we would get better prices for them than we do to-day. There is no place in the world better adapted to sheep raising than Ontario. We are free from disease, which is not the case in a great many other countries, where the shepherd has to carry his medicine bottle continually, in order to treat the different diseases to which sheep are subject, such as scab, foot rot, liver rot, and many others. England is the breeding ground for new blood for our Canadian sheep, and what England is to Canada so should Ontario be to the Western States, Australia, and the Argentine Provinces.

Some one asks, "What breed of sheep would you advise me to keep?" I would would make no distinction in any of the mutton breeds, such as Cotswold, Leicester, Lincoln, Oxford, etc., whichever is best suited to your locality and liking. My advice is in starting a flock don't buy too many, as it does not take long to get a large flock from a few, but get the best you can and remember it is not so much the breed as the care and attention given. Some one asks, "How do you care for and feed your sheep?" It is not necessary to have an expensive building for sheep. Just keep them dry and comfortable, not too close and warm, and have good racks in which to feed them. I sow a good big field of peas and cut them before they get too ripe, then take pains to get them harvested in good shape, thresh them with a flail not being particular about getting all the peas out. I give the sheep all this pea straw they want, with a very few roots till lambing time, after which I give them all the roots they want, with a little bran and some clover. In summer I give them good pasture, changing them from one field to another about every two weeks. To prove to you what I have said is true, that there is profit in sheep raising, I will tell you what I realized from thirty-five Cotswold ewes in 1897. I have sold $935 worth of sheep and wool, and have thirty ewes left.

THE FLOCK ON THE FARM.

By John LeBoutellier, Glen Miller, Ont.

Since the advent of dairy husbandry, this branch of the farm has received less attention, and the care of sheep to a great extent is a lost art. I think this a mistake; for if, as the old Spanish proverb says, "The sheep touches the ground with a golden foot," we are neglecting to fertilize our land by this agency. Unlike the dairy cow, whose milk manufactured into cheese and sold from the farm is a loss to the soil of important mineral constituents, the sheep suckles her young to maturity and adds to the wealth of the soil besides contributing to her owner two crops a year. If, instead of the old fashioned summer fallow, we would sow rye or rape to be eaten down by sheep, two objects would be accomplished, the enrichment of the soil and the ridding it of noxious weeds. Could not our old orchard be so treated and thus be improved? Have we no sandy hills that now are barren and unproductive that might be utilized as sheep pastures by seeding down with lucerne clover?

Sheep husbandry, in England, has been and is an important factor in her prosperity, and although in this country it is not possible to keep large flocks, a few sheep should be kept on every farm. In response to several questions addressed to the Experimental Farm, Ottawa, on the subject of sheep, I was informed that no attention has yet been given to this important branch of farm stock. Such is not the case at Guelph. Is dairying to overshadow all other parts of our business? Is there no danger of serious deterioration of our lands, as is now the case in old dairying districts? While we deplore the decrease in the number of sheep in this vicinity, we fear that there has been no decrease in the number of sheep-killing dogs, which fact may determine many farmers from keeping sheep; but if the Dorset sheep are as pugnacious as represented, we have a breed that will meet this difficulty. This fact combined with their other qualities will render them very profitable. The want of proper fences may make it difficult in many places to keep sheep, but if, as a prominent Cotswold breeder tells me, his sheep will not jump a fence three rails high, another difficulty has been met.

Let us study well the requirements of our land, decide what kinds of grain and stock are best suited to our farms, but by all means let this useful animal have a place, for it will well repay the small amount of care and feed it claims. Nearly three-fourths of the year the sheep are able to get their own living. Of late years my practice has been to sow rye in the corn field at the last cultivating, and this furnishes both fall and spring pasture for sheep.

CARE OF LAMBS.

By J. B. Ewing, Dartford, Ont.

Farmers in the Province of Ontario who have been readers of agricultural papers during the last few years have often noticed articles headed with this advice, "Keep more sheep." Among the many reasons given by these writers why more sheep should be kept, one is that they require less labor than any other stock kept on the farm. This is indeed very true; but at the same time care and attention at certain seasons of the year is absolutely necessary to profitable sheep raising. Carelessness and neglect, more than ignorance, I think, is responsible for most of the failures in the sheep business. When the ewes lamb early, say in February or March, they should be liberally supplied with good feed, that they may give a good flow of milk; otherwise, if not well fed, they will dry off in their milk, and the lambs will get such a serious set back that they will not recover during the summer. Lambs born about the last of April or beginning of May, if their dams are on the fresh grass, will grow well from the start, and will often, in the fall, outweigh those that are two months or six weeks older.

The early lambs can be assisted to a considerable extent by feeding a little oats, bran and oil cake, placed in one corner of the fold, so arranged that the old sheep cannot get in. It is necessary to exercise a little care in doing this, and feed very light, as some of the older lambs will eat enough to sicken them. Docking is something that should not be neglected; better do it when the lambs are about a week old. All the ram lambs not wanted for breeding purposes should be castrated. This may be done with perfect safety when the lambs are from three to six weeks old. The operation may stop the growth a little at the time, but later in the season when the ram lambs are getting restless the wether lambs will be quietly feeding and thriving. There is yet another advantage in castrating. We do not have to sell the lambs when the market is overrun. As a rule we are anxious to sell the ram lambs when they are becoming a nuisance around the farm. This is generally at a time when there is plenty on the market, consequently the price is not very high. The wether lambs may be fed on and go to market when the rush is over. The chances are that they will then make more money for their owner than if they had not been castrated.

Another important point is to keep the flock free from ticks. It is enough to feed our sheep without pasturing hundreds of these miserable vermin upon their bodies. Various estimates have been made as to what it costs the Province of Ontario annually for damage done by injurious insects. Most of these usually reach up into the millions. There are over a million and a-half sheep in Ontario. The careless sheep farmer no doubt contributes many thousands to this, in his case, unnecessary tax. If a little care is taken at shearing time, most of the ticks on the old sheep can be destroyed. About two days after shearing the lambs should be dipped, and in about a week or ten days they should be dipped again. This will destroy all the ticks recently hatched; the first dipping does not destroy the eggs.

I think one of the reasons why dipping is neglected by many of the farmers is the lack of some convenient arrangement for doing it. I have tried different contrivances myself, and have one at present I have used the past two years with good results. Take an ordinary V-shaped trough ten or twelve feet in length; board up the sides, say, two feet high, or high enough to prevent a lamb from jumping out. Place this trough in such a position that any liquid put into it will all run to one end. Place the dipping tub, which may be a barrel or old milk can, at the lower end, close up, so that the sides of the trough will rest on it. I use the Cooper Sheep Dip. In order for it to do the work effectively, it is necessary to hold the lamb in it for one minute, being careful not to allow its head to go under. The upper end of the trough is open. A boy stands there and can do two things at once. When the trough has become full of lambs he can let one out at the top end as one goes in at the lower end out of the dipping tub. He can hold a watch at the same time and tell when a lamb has been in a minute. While the lambs are standing in the trough draining off, the dip is running back towards the dipping tub, where it can be used a number of times. Two men and a boy can dip sixty or seventy lambs in almost as many minutes. The cost need not exceed seventy-five cents.

SHEEP BREEDING AND FEEDING.

By C. N. Christner, Haysville, Ont.

The breeding season is properly the beginning of the shepherd's year. It is at this time that fresh blood is infused through the purchase of a stock ram, and also that an opportunity is afforded for inspecting and culling out from the flock such ewes as may not come up to the standard required. At this time the shearlings that have not grown sufficiently should be disposed of or placed by themselves to fatten, also all old or weakly ewes that have outlived their sphere of usefulness. If thoughts are entertained of adding fresh ewes to the flock, this is probably the most advantageous time for doing so, as at this time breeders have more to dispose of than at any other time of the year, and the purchaser will now have the advantage in determining the cross or manner of mating that he may wish to pursue.

In this country sheep are ordinarily bred and kept by two classes of farmers, one of which breeds only such as are known as recognized sorts, or pure bred. These dispose of their surplus in the shape of shearling rams and ram lambs to be placed at the head of the more ordinary flocks. To these breeders this article is not written, except to bid them improve their flocks to the greatest extent in their power. For those who are careful and painstaking in breeding and feeding there is much encouragement to increase the number of their sheep if they will also improve the quality of their flocks. It is to the farmer as a breeder of butcher's or export sheep that this article is addressed. With every farmer stock of some kind is a necessity in order to consume what is being grown on the farm. In this particular sheep have many advantages over other stock. First, the outlay, or capital required, is less. Next, they pay a share of their annual feed bill with their wool. Again, the produce in lambs, if properly kept, is always ready for sale, from two months old and upwards. In autumn you purchase your flock, or add to those you already have, and in less than a year you can sell a sufficient number to recoup the whole outlay, or part, just as you see fit.

All ewes should be neatly trimmed and the ram's breast smeared with paint before he is placed with them. After the first seventeen days, the period at which the ewe returns, a different colored paint should be used. Then a strict account of the dates of service can be booked, which will be found to be valuable at lambing time. As the ewes become due to drop their lambs, they can be placed in a warm building. At the mating time the flock-master must be guided by what he aims to do with his ambs. Early lambs require more liberal feeding of the ewes. It must be borne in mind that a late lamb is the best unless the ewe is in first rate condition. A thin ewe with an early lamb costs more for feed than the lamb will be worth, while the early lamb pays best if the ewe is kept in good condition. The early lamb, if properly cared for, will be ready for an early market, and will be taken early from the ewe to give her a chance to regain flesh before winter, which is of the utmost importance in the case of early lambs ; for if the ewe goes into winter quarters thin, she will not be likely the gain up in time to give sufficient milk to push forward her lamb or lambs, as the case may be, and the result will be weak lambs. There are more dead lambs from ewes being too poor than from being too fat, although care must be taken not to over feed the in-lamb ewe. Give them a good supply of clover hay, and a liberal feed of roots and grain ; if clover hay cannot be had, good clean pea straw will answer the purpose. For the grain I would suggest a mixture of oats and peas, a ration of three bushels of oats to one of peas ; feed twice a day at the rate of one and one-half pints per day per head. After the ewes have lambed, drop the peas and change to chopped oats and bran mash, with an increase of roots to increase the flow of milk. Keep the lambs growing from the time of birth until they are marketed, for if once stunted it will take a long time for them to regain a vigorous growth.

When lambs are about two weeks old they begin to nibble at the meal with thei mother. Partition off part of the pen and leave a space so that the lambs can run in and out at will ; place a trough so arranged in this pen that the lambs cannot get their feet into it. Keep chopped oats and pulped roots and clover hay in this trough. In a few days the lambs will begin to eat by themselves. After the ewes are turned out to grass have them trained to come home to their pen every evening. This can easily be done by giving them a little grain once or twice a week. The lambs can get at the feed prepared for them, and the flock will be out of danger from dogs. After harvest turn your sheep into the stubble to pick up the waste grain, but if a liberal supply of wheat or peas can be had, keep them from going to water as often as they desire; for when they have their stomach full of wheat or peas and take a drink good results will not follow.

Immediately after the fall wheat is harvested, in some sections the stubble can be worked up and sowed with rape, which will prove a very profitable and cheap feed.* A field of clover should be so situated that the lambs can go from one field to another as they prefer. When the lambs are first turned into rape it must be dry. Leave them in about one hour. The next time a little longer, and so on, for a few days, until thoroughly used to it. Then they can stop in wet or dry. When pasture becomes short and stall feeding is thought of, a trough should be placed in the field so as to accustom them to come up and eat, so that when housed they will eat right along; if not accustomed to eat out of a trough before being housed they will not eat for a week or ten days, and will shrink considerably. When the flock is large more than ten should not be put into one pen, as the stronger lambs will push back the weaker ones and very often eat too much. Start them slow on half peas and oats, with roots; increase carefully to as much as they will eat up clean. Have your pen so arranged that the lambs can have all the exercise they want, for lambs must have plenty of exercise; shearlings and older sheep will do with less.

In breeding for mutton the success or failure depends on the breeder. There is plenty of room for a good article, while there is only a low price and slow sale for second rate stuff. A man with a frowsy head and shabby untrimmed beard never passed for half his worth, so a neglected rough looking lot of sheep never brought any credit to their owner, nor did much to increase his balance at the bank. Our young men and shepherds should wake up to the importance of this point, and keep their sheep nicely trimmed, clean, and neat at all times.

SWINE HUSBANDRY.

By Theodore Louis, Louisville, Dunn Co., Wis.

Swine husbandry, unlike any other animal husbandry, offers opportunities from the smallest beginning, with the least outlay of capital, and has paved a way to prosperity on thousands of farms. The hog will be contented with enough to eat, and will endure great hardship and thrive under adverse circumstances, and yet no animal enjoys, and responds with quicker and better returns for food consumed and good care; but what ingenuity and a little grit can provide in the line of shelter, if it is warm and dry in winter, protected from storm, free from draft, with shade in summer will be well repaid. This is not saying that comfortable, well arranged shelter for feeding and housing will systematically lessen and lighten labor, but he, who from the small beginning infuses system, will be for all future the successful breeder and feeder that surmounts all obstacles. It is not the intention of the writer to instruct swine breeders and feeders who are his superiors along this line of work, but the vast number of farmers who have given the subject little or no thought, and so often pursue the business to disadvantage; and surely the opportunity of the Canadian farmer is not to be depreciated, for with the advanced prices the packers pay, with an ever increasing export demand for their improved product, they have nothing to fear in the line of competition, as the American packer holds out no inducement to the swine raiser in the line of the bacon hog.

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* Many successful sheep growers sow rape seed among the spring grain at seeding time, and also in the spring on their fall wheat land. In some sections the rape does very well, and gives an abundance of excellent fall feed. Try it.—Editor.

BREEDING. I am a firm believer that the best is only good enough, whatever breed is chosen. The breed, however, should suit the requirements of the best paying markets and at the same time give best results for feed consumed. Past experience leads me to say it is to the advantage of neighborhoods or districts to adopt the same breed of hogs, if they fill the requirements above mentioned, for the reason that boars can be retained to a greater age and maturity, providing a strict record of their line of breeding is observed, in order to avoid injudicious inbreeding. There is an ever-growing tendency to breed from young immature stock, the breeders being roused by the demand of the markets for light weight of tender age. We should bear well in mind that while the art of breeding has developed hogs of all leading strains which at the early age of from eight to ten months fill this requirement, this early maturing falls far short as to maturity for breeding. In no line of live stock is this law of maturity for breeding so much disregarded as in the breeding of swine. The frequent complaint that this or the other kind of breed does not respond properly to feed in the line of growth, and seems to be subject to difficulty in gestation, deficiency in number of pigs to the litter—these and many other complaints are seldom charged to where they properly belong, viz., to immature breeding, injudicious selection, and the indifference in the selection of food to develop them. If more mature sires and dams were retained, those that have proven themselves capable of reproduction and improvement, as to uniformity, improvement, prolificacy, good mothers and milkers, that have been perfected and developed to full size and vigor by age—only by the use of these can we expect to retain the improvements handed down to us by master breeders. When indifference is replaced by proper selection and retention of the best, improvement is the sure result. Is it not the duty of the farmer and feeder to acquaint himself with the laws of breeding which tend towards steady improvement? The above recommendation in regard to the retention of sires is most necessary to success and improvement, and carries most weight without further comment. Another practice that has a tendency to depreciate the standard of excellence is to allow hogs liberty to serve sows *ad libitum*, and to be turned out with the herd or confined with a number of sows in a yard. Is excessive service less harmful to future offspring of swine than of other live stock? One service as a rule will give satisfactory results as to the number of vigorous pigs, while when the other system is followed small litters, dead pigs, deformed pigs are the result, but in swine breeding this is ascribed to bad luck, while the horse breeder would charge it to excessive use of the sire.

Build a paddock or yard four or five rods square, with a shanty-like house 7x8 feet, 7 feet high in front, 5 feet to rear, with a door 2½x4 feet high to permit of entrance when cleaning it, a half drop or swing door on hinges attached to the upper part to keep out beating storms and cold, and a tight board fence, high and strong, which will prevent teasing the sows, and will also prevent fretting and irritating the boar. This often has disastrous results, the boar becoming impotent by self abuse, especially in the case of young sires. There should also be a feeding floor in one corner of the yard, 8x8 or 10 feet, so that a large boar can stand in front of the trough—a "V" shaped trough of three feet in length, securely fastened to floor and wall. A plank should be securely fastened edgeways with spikes to end slippers, and stakes firmly driven home to guard against his natural propensity of 'root hog.' At the corner a slide gate 2½x3 feet, should be placed, to permit the entrance of sows. At the further end of the floor build the pen. This may seem like extravagance, but when we take into consideration that a yard of this kind will last from fifteen to twenty years by simply reposting it, this will lose its force, and furthermore to have a boar under control and use him at will is worth a great deal. If the yard can be situated so as to give natural drainage it is an advantage, but it is essential that a hand rake, shovel and fork should frequently be used to prevent contamination. But while secure and under control, the boar should never suffer for a food ration calculated in its nature to develop him; he should not suffer for the want of green food and succulent food when the season permits, and in fall and winter squash, pumkins and roots should not be wanting. Nor should he be deprived of charcoal, ashes and salt—in fact no hog should.

THE SOW. If it is of importance to retain the boar to a greater age and until further development, it is of equal importance in the case of the sow. Too many do no deem it essential that they should have a system of feeding; if not, why not? Why can we not have a note book, a list and a record of the sows that have proven themselves superior in all respects. Why not retain her as long as she proves satisfactory, instead of using a young untried one that has not been selected with regard to heredity and the virtues of a mother, a breeder, and her milking qualities, but because she is pretty and she is a sow. If sows are selected yearly to replace those weeded out—those that have proved unsatisfactory—they should be selected from only the best and most profitable mothers so that improvement will keep pace with reproduction. This selection should be deferred until the pigs are from three to four months of age, as we can then better judge their development and disposition and they should be fed on the very best growing and developing food available. We have found it a good practice not to breed the sow for a second litter the first season but to give her a chance to recover from the strain so as to fully develop in size and vigor. Thereafter we breed her twice a year and it appears to the writer that this second litter in the present condition of Canadian markets would be a paying investment as August and September pigs would the following season fully fill the requirements of this market and at remunerative prices.

We have an inflexbile rule that no young sow is bred before she is eight months of age. It will also be found of practical advantage when having a list of sows in a note book either with name, mark or number; or for convenience put a ring in the right or left ear, the upper or under side, to note the time they come in heat, say in October; any farmer knows that this will occur each three weeks. In this way he will not waste time in watching when to breed the sows or be disappointed in missing her, but one who never practised it will find to his astonishment that he is becoming master of the situation. With thé boar in the enclosure, able to regulate the service, and knowing that the gestation period takes place within 110 to 112 days, he will know that by March or April first, as the case may be, he must be ready to accommodate 10 or 12 sows with breeding pens and play midwife day and night. As a compensation for labor and system he has a lot of pigs of nearly the same age and size to feed and care for, a uniform lot to put upon the market, not to mention the advantage of being weaned at one and the same time. This is not a fine spun theory but has been the practice of the writer for a long series of years.

The sows can then be turned out to pasture and receive a liberal allowance of feed once or twice a day, at stated time according to their condition, in order to have them fully recover from the strain of nursing and breeding. All that have proved deficient are weeded out for fattening, and young sows are put in their place as heretofore stated. But sows having their first litter should not be condemned for having a litter of but five pigs, if they are otherwise satisfactory and are uniform breeds. A twelve or fourteen teated sow, of roomy build, generally responds with sufficient numbers at her second litter, unless heredity on her dam's side is wanting in this quality. But should there be small and uneven litters with the larger number of sows the sire may be at fault.

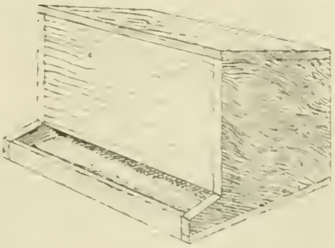
FEEDING. While selection and breeding are of great importance, most of the value may be lost by poor, unsystematic management and feeding; at the head of this stands good pasture. I care not whether the Canadian swine breeder and feeder lives on the plains of Manitoba, or in the timber belts, or in the thickly populated portion of Ontario, pasture is one of the key notes to success. The excuse of fencing has been obliterated by modern inventions of all kinds of wire fencing, and railroads have almost equalized the cost of fence posts in the remote prairie region. Pasture not only lessens artificial conditions but is a source of revenue in the saving and distribution of valuable manure, that is often otherwise lost or becomes the breeding ground for infectious diseases when pen and yard system is relied upon. It adds to the general thrift and health of the herd, and lessens the cost of production. The pigs should not be permanently pastured in one place but subject to change, as our experience bears us out in stating that the increase in yield of crops make it a paying investment.

The pigs selected for breeders should receive particular attention, care being taken to see that they are properly developed. They should not become fat. I know well that caution is not needed to overfeed on corn, but other feeds fed to excess may create a fatty condition, detrimental to the healthy growth and development of animal tissue. Your oats, peas, barley and milk are feed *par excellence*, together with clover or rape to develop breeders of the highest type of constitutional excellence. This applies with equal force to all breeding sows, especially after they are bred and safe in pig. Where a number of old sows are retained, young sows should be fed and should sleep in separate pens. We firmly believe that daily exercise is essential for pregnant sows. All crowded conditions in sleeping places, and worrying at feeding troughs bring their own penalty at farrowing time. We have also found, by long years of practice, that to steam our food in winter, to bring the food to boiling heat, so as to soften the grain and burst the starchy part and feed it warm, at eighty or ninety degrees, is very satisfactory. We daily steam clover heads and leaves and fine stems, and later on add the ground grain ; nothing has proven more valuable in the line of a healthy digestion. At the same time we find mangels in the raw state keep sows and fall pigs in a thrifty, healthy condition.

It has also proved a successful practice to feed a sow expecting to farrow, for ten or twelve days, in the pen where she is to farrow, and let her sleep there, but allow her her freedom until near her time of gestation. She will then be contented with her quarters. It is, however, essential in winter and in spring that fenders should be in each pen to prevent overlaying. Give her her usual ration, and don't fail to supply her with water while she is preparing her nest.

After she has given birth let her remain quiet, and when feeding her let it be more in the shape of a drink than solid food, and bring her to full rations in eight or nine days, but never overfeed her. Judgment is taxed from this out. She knows that feed makes milk, but is without judgment, therefore, the feeder may obviate many complications and losses by observation. The losses caused by injudicious feeding are not generally understood or known. If space would permit me to sum up the complications and losses thereby, it would astonish the average feeder of swine, and the subject would receive more thought and study. The nursing sow's food should be of such a nature and composition so that the little pigs by degrees will learn to eat with her at an early age. If shallow troughs of good length are provided instead of deep short troughs, they will very soon commence to partake of the food. This will obviate at weaning time a radical change and lessen the danger of derangement of the digestive organs. Unless a sow is to be rebred for a fall litter, we prefer to let her nurse three months. Our experience leads us to say that small grains such as wheat, barley, rye, oats, to give the best results, should be ground and be thoroughly soaked, but it is a great mistake to mix an excess of water or swill with the solids so as to force the animals to consume it against their will and need. We further prefer middlings or fine shorts to ground oats at equal prices, for nursing sows and their pigs, as the oat hull becomes a disturbing element to digestion, and when we consider that one-fifth of the oats are hulls it is an expensive food.

As in Canada charcoal is obtainable at all times, it would be useless to give our method of burning corn cobs into charcoal. The following is the mixture or condition powder that our hogs have access to, and to its use I largely attribute the good health of our herds. The higher the system of feeding the more use hogs make of it. Take six bushels of charcoal, the finer and smaller pieces into which they are broken or mixed with the dust of coal, the better it will be ; put them in a large box or on a floor, and add one to one and a half bushels of wood ashes (hard wood) and six pounds of salt



A self feeding box.

Mix this thoroughly. Then dissolve one and a quarter pounds copperas in a large pail of hot water, (we use a tobacco or candy pail) ; sprinkle this on the above with a sprinkling pot but be sure to mix as you sprinkle so as to evenly distribute it. Then make a self-feeding box (see cut) with a cover to it, and set it where the hogs will have free access to it. Stake it down so that the hogs cannot rub it over. It will tell its own story, and if used once the judicious feeder never will be without it thereafter. It is a good plan to have a slanting board inside the feed box so that the mixture will follow to the front opening.

Last and not least, he who has not the motto in mind or written on the pig pen door, that pigs must grow from the farrowing time until ready for the block, will never realize the profits there are in swine breeding and feeding. It should also be borne in mind that excessive milk feeding without a proper amount of grain meal added, is not only detrimental to health and growth, but is a direct loss. Many examples have been published on this subject by the most successful and reliable experiments of late, and it is high time that any dairyman who feeds the adjunct in connection, and has not profited by free publication on this subject, should go out of the business.

SWINE BREEDING.

By T. G. Raynor, Rosehall, Ont.

So much is said and written these days on nearly every theme of agriculture that there is little or no room for saying anything new on any subject. However, there are two redeming features in writing an article of this kind. First, each man has his own way of telling his story, and secondly, there are always those who are in the A B C of agriculture, and will read such articles for the first time. With these thoughts in view I shall venture a few statements on the subject of swine breeding.

In the first place let us notice the outlook for this branch of farm production. The cry has been with regard to farm production that there has been either over-production or under-consumption in many lines, incluing the pig industry. The great hog-producing states as well as corn-growing states, such as Iowa, Illinois, Wisconsin and Minnesota, have all been visited by hog cholera, which has perhaps more than decimated the number of hogs in those states. Many large herds have been completely wiped out. Great Britain imported in the year 1895, $114,109,534 worth of dressed meats. Of that amount Canada furnished $4,608,904 worth. Canadian bacon is in higher favor than ever before on the English market. There seems to be no reason why Canada should not have a larger share in the English market than she has now. Again, England imported in the same year $14,317,446 worth of lard and Canada sent of that amount only $103,833 worth.

I believe there is room still for improvement in our swine herds as well as expansion. In selecting a sow as a breeder, I would select one with at least twelve teats. I would want her to have a good heart girth, which means no hollow back or rainbow belly. One of the most frequent mistakes by farmers is that they breed many of their sows too young. For well matured, growthy pigs, I do not want the sow to breed under one year of age and I should certainly not have her farrow her first litter under one year. With too many of us, however, this is more the exception than the rule. I would not breed from deaf sows as they are apt to overlay their pigs, and many fine litters are decimated if not obliterated because of this infirmity. To tell whether a sow is deaf or not, watch her when you call the other pigs to eat. If she does not come when you call, but is simply aroused by the others getting up, rests on her haunches awhile, until she sees the others eating and then starts up, you may depend she has defective hearing.

A record of sows coming in heat should be kept. A sow comes in heat every three weeks or twenty-one days. With a memorandum book one can tell when their sows will be in heat a second time if it is not wished to breed them when in heat the first time. There is a great advantage in having a memorandum book, as one can regulate the time for his sows to farrow. If a number of brood sows are kept, several can be had to farrow at the same time. A sow carries her young 112 days, but young sows often farrow in 108 or 110 days. Birth most frequently occurs at night, when everything is quiet, and by having a number of sows to farrow together, it is only necessary to play the midwife a few nights. Then if one has a lot of pigs the same size and age, they will please a buyer better and he will give the top price for them.

The selection of the boar is very important. He should be a pure bred, and as far as possible selected with a view to correct any defects which the sow may have. I want him to be a strong, vigorous boar, and a matured one is better than an immature one. One good service of the boar is quite sufficient, and far better than more services at the same time. Some men want a lot of pigs and think that several services are necessary to produce plenty of pigs. They don't know that deformed pigs, dead pigs, and difficult birth are more frequently caused by excessive service than by anything else. In the management of the boar, I want him to have a roomy yard to run in, also a shelter large enough for sleeping and eating in. The shelter should be high enough to admit a man easily, otherwise the hog might suffer from lack of cleanliness which is not conducive to the best results. The boar should have plenty of green food given to him throughout the summer. Many weeds while green may be put to profitable use in this way. In winter, roots and clover leaves will take the place of green-growing plants.

In the management of brood sows I want them to have plenty of liberty for exercise and a variety of food. The food I like to have largely made up of bone, blood and muscle-forming foods In winter, a mangel or turnip a day for each sow helps to keep them healthy. Steamed clover siftings with a little grain and a condiment of charcoal and salt helps to keep the sow in a good healthy condition. A week or so before farrowing I get the sows used to eating in the farrowing pen, but don't shut them up until two or three days before farrowing. Be careful not to feed too heavily, as milk fever is frequently caused by injudicious feeding just before or after farrowing and often a loss of the sow and her litter follows. After the sow has farrowed it is advisable especially in winter to give her a little luke warm water to drink, with a little bran or shorts mixed in it. I feed water lightly for two or three days until danger from milk fever is over. Then I gradually increase the feed until she takes all she will, eating it up clean. I feed sloppy food at the first, such as will run from a pail, and a mixture of such foods as will build up bone and muscle. The pigs are allowed to run with the sow six or eight weeks for feeding purposes, and three months if intended for breeding purposes. Then when the pigs are weaned, push them for all that is in them to the weight required by the market, and in my opinion that is the best way to make money out of them.

BREEDING AND FEEDING HOGS FOR MARKET.

By John McMillan, Seaforth.

In these days of close, keen competition, when every country is competing for supremacy in the markets of the world, the first things to consider are what is the class of goods that the markets demand and will it pay to produce such goods? The time was, and not so many years ago, that it was the fattest and heaviest hog up to 300 lbs. that commanded the highest price. This is all changed within the last few years; now a pig is required that will give a long, deep, lean side of meat—one that is not more than one hundred and ninety pounds in weight. Then comes the question which breed of hogs will best fill the bill, by giving the desirable kind of a carcass with the smallest consumption of food? The Experimental Farm at Guelph gives the results of experiments with different breeds of hogs and the amount of food required to increase the weight of the animal one hundred pounds. The age of the hogs at the beginning of the test was ninety-three days; at the end of the test the age was two hundred and ten days.

—	Food consumed in 117 days	Meal for 100 lbs. grain.
	lbs.	lbs.
Berkshire	475	395
Poland China	507	417
Yorkshire	589	468
Chester White	557	452
Tamworth	469	400
Dourocc Jersey	580	424

This experiment will only apply to the animals in the experiment and may not apply to the different breeds as a whole until further experiments are made in the same direction to confirm or set aside the above statements.

In selecting the sows to breed from, get them lengthy and deep bodied, long underneath, with a good strong back, thin and fleshy, not a broad flat back, deep bodied, well down in the flank, with two good rows of teats, and the head and neck light. Always breed from a pure-bred boar. Have the spring pigs in the beginning of March and the fall litters in the end of September. Do not breed from sows until eight months old, and if good breeders keep them until eight or nine years old. Sows want a warm dry place to lie in and plenty of exercise when in pig. Feed them plenty of roots. We feed mangels whole (they can scoop them and it gives exercise). We also feed a little grain, a mixture of bran, barley and peas or corn, with a little oil cake, only enough to keep them thriving, not enough to make them very fat. Let them have access to charcoal, ashes and sulphur, and if shut up throw them a few sods occasionally. Before farrowing shut the sow up in a warm dry place with cut straw for bedding; it is better than long straw. Poles or scantling should be arranged around the walls to prevent the pigs from being smothered by the dam when she lays down. After the sow has pigged, give her a warm drink with a little bran or shorts, nothing more for at least twelve hours, then begin and feed, not too much at first, but as the pig grows she must be fed liberally with bran, ground oats, barley and plenty of roots. As the pigs grow give the sow all she will eat. When the pigs are about three weeks old have a trough placed which they can reach, away from the sow. Give them a little milk with a little shorts and bran. As soon as they begin to feed, pulp some mangels or turnips. Castrate them before being taken away from the mother; wean when about six weeks old, then feed them liberally with roots, bran, shorts, corn meal, pea or barley meal and a little oil cake, and let them have exercise. A clover field in summer, with a liitle meal and running water, is about the best treatment they can have. In winter clover hay put through the straw cutter, with roots and a little meal, is good feed and makes excellent bacon pigs. Let them have charcoal, salt and sulphur all the time. They must be kept clean and dry and have a yard to exercise in.

An experiment was made at the Agricultural College, Guelph, on November 18th, 1895. Twenty-four pigs were bought in Guelph costing $31; cost of food until June 2nd, 1896, $99.33. Total cost, $130.33. Weight June 2nd, 1896, 4,841 lbs. At $3.85 per hundred, $186.37, leaving a net profit of $56.04.

Total food consumed for six months and a half as follows:

847 bushels roots at 7c per bushel	$59 29
1,082 lbs. middlings at $15 per ton	8 11
2,500 lbs. bran at $12 per ton	15 00
1,464 lbs. grain and bran at 75c per 100 lbs	10 98
3,300 lbs. skim milk at 15c per 100 lbs	4 95
30 lbs. ground flax seed	1 00
Total cost of food	$99 33

There were 9½ lbs of roots fed for every pound of grain, which I believe was one cause for the large amount of profit. In my opinion there is no stock kept on the farm that will give the same return for the value of the food consumed as the hog. In experiments that have been made with cattle, sheep and hogs, it has been found that the increase in the weight of the different animals for 100 pounds of dry feed was: an ox gained 9 lbs., a sheep 11 lbs., while a pig gained 23 lbs. It has been said that it is on account of being pea fed that Canadian bacon stands so high in the British market. But I think the statement made by W. M. Grant, of Woodville, is correct when he says, "I think I am safe in saying that fully 99 per cent. of the hogs raised in Ontario have been raised, fed and finished on roots, clover hay and a ration of mixed grains, and any pork packer who has made a study of his business ought to know that it is due to the mixed feed, not to peas, that our bacon is of a superior quality; and it is for the same reason that the Danish bacon holds so high a place, for the Danish and Canadian farmers follow the same system of feeding." There is no grain grown that contains all the essentials of food, and it is only by mixing that anything like a perfect grain can be found. In an experiment made, 100 lbs. of milk increased the weight of a hog five pounds, and a bushel of corn increased the weight ten pounds, but when the milk and the corn were fed together, the gain in weight was eighteen pounds, as against fifteen pounds when fed separately.

KEEPING HOGS FOR PROFIT.

By A. P. Ketchen, Brucefield, Ont.

Until recent years the hog has not received the attention from our Ontario farmers, to which he is justly entitled. He has been regarded as a sort of necessary evil; something to be tolerated, not encouraged. But I will venture the assertion, that we have not in Canada to-day any more important branch of agriculture than hog raising. Nor have we any other class of live stock that is yielding the farmer a better dividend on capital and labor invested. I am indebted to the report of the Bureau of Industries for 1896 for the following figures. During the fiscal year ending the 30th of June, 1896, there was paid to the farmers of Ontario as follows:—

For Cattle........................	$12,381,248.
" Hogs........................	10,022,525.
" Sheep........................	2,646,709.

By comparing these figures with the report for 1892, we find that while the receipts from cattle have decreased, $3,597,887, the receipts from hogs have increased, $1,246,673. It will be readily seen from these figures that not only does the hog rank well up towards the front as a source from which the Ontario farmer is deriving his revenue, but that he is destined, at no very distant date, to equal, if not outstrip, our much and justly boasted of cattle trade. The question may arise here, is there not a danger of overproduction, and thus force prices down beneath a paying basis? An examination of the trade returns of Great Britian, reveals the fact that while she imports annually some 575,000,000 lbs. of hams and bacon, Canada's contribution is only some 45,000,000. The United States is sending over 451,000,000, while Denmark, whose total area is less than that of the Province of Nova Scotia, is furnishing her with 52,000,000, or 20% more than the whole Dominion of Canada. So it appears, that if we can capture the British market, it will afford us a practically unlimited outlet for all our pork products for many years to come.

The question confronting us now is, will it pay us to develop this trade? To which I do not hesitate to reply that it will. We have a country and a climate admirably adapted to swine husbandry, and we have to all intents and purposes a clean bill of health. The reputation of our ham and bacon has reached a mark in England to which the Americans can never hope to attain, so long as they continue to regard corn as the first, last, and only diet for the hog. The Englishman tells us (and we must accept his judgment as final) that corn fed pork is deficient in color, flavor, and texture. Our dairy and pea fed pork is now esteemed in England on a par with the best Danish and Irish bacon, and commands accordingly the highest prices. This is a position of which the Canadian producer has reason to feel proud, and which we should take every reasonable precaution to maintain; and let me say just here that if we are to hold our own in the British market with any of our products, it can only be by maintaining and increasing the standard of excellence. We hear sometimes of preferential trade; but John Bull knows no preference commercially except for the best article, and the day in which the Chinese Empire sends him a better side of bacon than Canada, that very day will you find the quotation for Chinese bacon at the head of the market report.

We are sometimes tempted to boast of the magnitude of our cattle trade. I am very seriously inclined to the belief, however, that at least 25% of the live cattle exported from Canada every year, represents a direct loss to the producer. It is true that we require a certain number of cattle to consume our coarse fodder, and we thus convert into a marketable product that which would otherwise have gone to waste, and up to this limit cattle raising pays. But it has yet to be proven that a steer can be fed from birth to maturity on marketable hay and grain, and placed on the market at $4 or even $5 per cwt. and leave any margin for the producer. On the other hand, careful experiments, conducted by competent men, have repeatedly demonstrated that with the right class of hogs, properly handled, pork can be produced at a profit at the present relative prices for grain and hogs. In an experiment conducted at Guelph in 1889, sixteen pigs of an average weight of 90.6 lbs. were fed until they reached an average weight of 142 lbs.; and it was found that a cwt. was added to the live weight of the pigs for every 308 lbs. of shorts eaten, which at present current prices would cost about $1.80. In a similar experiment conducted at Ottawa, four pigs averaging 77 lbs. were fed until they had reached an average weight of 181 lbs. It was found that a cwt. was added to the live weight of the hogs for every 354 lbs. of mixed grain fed, which at the present prices would cost about $2.10. These figures are borne out by our own experience. In the fall of 1896 I weighed a bunch of pigs averaging 118 lbs. They were running in a common June grass pasture, supplemented with a liberal ration of grain, and I found that I was producing pork at a cost of $2.25 per cwt. In the fall of 1897 we succeeded in producing pork on hogs running in rape, supplemented with grain as before, at a cost of $1.90 per cwt. It will be noticed that these were heavier hogs than those fed at either Guelph or Ottawa, which accounts for the slightly higher cost of feeding. The first cwt. can be produced very much cheaper. But estimating the entire cost of production from birth to maturity, including the first cost of pig, to be $3.00 per cwt. and its market value to be $4.50, it would still leave a clear profit on the investment of 50%. Now if there is any other branch of agriculture, that will yield a better return for capital, and labor invested, I am anxious to hear of it.

Swine have a decided advantage over cattle too, in that they yield us quicker returns. For instance, a steer represents a steadily accumulating outlay of capital and interest for three years before he can be expected to yield any return. On the other hand, I have turned my money over in hogs six times during that period, and assuming that I have managed my business skillfully, I have reaped six profits, while my cattle-rearing neighbor has been making one. Other advantages that might be mentioned are, that less capital is required and less expensive buildings are necessary; there is less risk of loss from death and the superior value of hog manure is undisputed. I do not for a moment pretend to argue that every farmer should become hoggish all at once, and go extensively into the feeding of swine; but I do affirm that our present output of hogs and of their products might be very largely increased with decided advantage to our farms. In the economical production of pork the animal required is the hog that will produce the greatest *value* of pork at the smallest possible cost; and just here is where the battle of the breeds comes in. It is a pretty generally accepted fact that a cwt. of pork can be produced at a minimum cost on some of the smaller and finer breeds of pigs, such as the Suffolk or small Berkshire. But when we enquire into the demands of the markets we find a discrimination against this class of pork, the packers demanding a long, lean bacon pig. And we must govern ourselves accordingly, for the buyers has, and will always exercise the privilege of dictating to the seller. In my judgment the ideal hog from the united standpoint of producer and consumer will be obtained by a judicious crossing of what we might term the longer, with the thicker breeds, selecting our dams from such breeds as the Large English Berkshire, or the Chester Whites, and mating them with Improved Yorkshire or Tamworth sires. In this way pigs will be produced possessing in a larger measure the feeding propensities of the dam, and coupled with this the size and conformation of the sire. The breeding sow should be selected from a large even litter; and care should be exercised to see that she comes of a prolific family, because fecundity like other qualities is hereditary and plays a very important part in determining the profit. A tendency to large litters is generally indicated by length and depth of side. Avoid a sow that falls away just behind the shoulders. This is a fault which generally indicates a weakness of constitution, and is a conformation to which the packers offer very serious objection. She should be evenly and symetrically proportioned from tip to tip, with no one point abnormally developed at the expense of any other; and last but not least, she should be of a quiet, contented disposition, and a good feeder. I have seen sows that would require more to keep them in good condition than others. This may be due to weaker powers of digestion, or it may be the result of a roving, discontented disposition. It is sometimes hard to account for these differences, but the fact remains that they exist; and since she is just as liable, if not more so, to transmit these as her good qualities to her offspring, the importance of care and good judgment in the selection of the breeding stock cannot be easily over estimated.

The brood sows should never be confined summer or winter; but should be given the run of a pasture in the summer, and of the yard in winter. I am confident that if there is one mistake that the farmers of Ontario make more often than another in the management of their swine, it is in the matter of exercise. They forget that the hog is a grazing animal, and that exercise is an absolute necessity to his welfare. More particularly is this the case with breeding stock. Our own practice is to run our sows in a small June grass pasture, and they get nothing else all summer until after harvest, when they get the run of the stubbles. As soon as the fall litters are weaned, the sows are turned out into the yard for the winter. A snug nest is provided for them to sleep in, and they are fed chiefly on mangels. This may sound like a return to the old fashioned times. I know you would expect to hear a man advocate the building of a more or less fancy stable, and at all events, a warm comfortable pen, with all the modern conveniences; and to talk of wintering a sow chiefly on mangels may sound to some like the rankest heresy. But the proof of the pudding is in the eating of it. We were formerly under the impression that brood sows should be very kindly dealt with, and accordingly we wintered them in a warm, snug pen, and fed them on a liberal ration of slops and grain, but in the spring we found ourselves with a litter of eight or ten puny, delicate pigs, with scarcely vitality enough to rise and suck. Of this number the sow would frequently take a notion to eat three or four, so that we became disgusted with that phase of the business and had all but decided to buy our young pigs instead of raising them ourselves. But acting on the advice of a prominent and successful hog breeder we have been wintering our sows in the yard and feeding them chiefly on mangels, and since then have had no trouble. Our pigs come "right on deck" ready for anything, and we have never since known a sow to eat her young.

We generally expect the greatest profit from our spring litters. I believe that by pasturing the pigs on clover or rape, and supplementing the pasture with a light ration of grain, pork can be produced at least twenty-five per cent. cheaper in summer than in winter. The hogs are getting exercise, and as a consequence are more healthy. Less labor is required; the manure is deposited where it is wanted, and no part of it is lost, and there is no waste of food in keeping up the animal heat. These advantages are in a manner offset by the fact that the hogs are ready for market at a time when prices are apt to be a little low; still, I think, all things considered, the odds are in favor of summer feeding. In winter we substitute mangels for the grass. I do not believe that pigs can be fed profitably, or at any rate that they can be fed to the best advantage on an exclusive grain diet, during the first four or five months. It has a tendency to stint their growth, and the pigs become too fat at an early age. There is also a danger when young pigs are fed too heavily on grain, of inducing that paralysis or loss of power in he hind legs, of which so many feeders complain ; it is generally the result of overfeeding on a too heating and stimulating diet. We should feed to young and growing animals a more bulky and easily digested food. We have found a ration of mixed grain to which a good supply of mangels has been added fills the bill as nearly as anything we have tried. Care should be taken to increase the ration as rapidly as the hog's power of assimilation. Avoid a surfeit, but be careful to feed as much as the pigs will eat up clean. It is well, too, to provide a change of diet occasionally. Even pigs will weary of the same bill of fare three times a day, week in and week out, and if given an occasional feed of corn in the ear, or boiled potatoes, or any other change which the feeder may have at his disposal, they will return to their regular ration with a more hearty relish. When finishing our hogs we add a large proportion of peas and barley to the ration, and deminish the quantity of mangels. It is good economy to force the hogs as rapidly as possible during the finishing period.

With this system of management we have no trouble in getting our hogs to weigh from 180 to 200 pounds at from six to seven months of age. It seldom pays to feed a hog after he has reached a weight of 200 pounds. In an experiment conducted at Ottawa with a bunch of pigs averaging 77 pounds, 100 pounds of increase was obtained from the feeding of 331 pounds of grain. When the same hogs had reached an average weight of 181 pounds, it required 573 pounds of grain to produce 100 pounds of increase; and when they had reached an average weight of 218 pounds, it was found that 693 pounds of grain were consumed for every 100 weight of gain. These results are corroborated by similar experiments conducted at Guelph, and also by experiments at several of the American stations. So I conclude that when a hog has reached a weight of from 170 to 200 pounds, it will pay better to place him on the market and give the food to younger animals.

Hogs that are confined in pens and highly fed require a condiment of some kind to aid digestion, and the fatter the hog the greater the necessity. As the digestive organs become clogged with fat, their ability to digest and assimilate becomes weaker. When a pig is running at large, he does not root up your pasture from pure love of exercise. He roots to obtain something for which his system craves. It is this craving that causes a confined pig to tear and gnaw at the trough or sides of the pen ; and hogs have even been known to tear apart brick walls in order to get at the mortar. A mixture of wood ashes and salt seems to supply this want fairly well. Charcoal is perhaps the best condiment, when it can be obtained ; ordinary turf sods are a splendid thing too. If a few sods are thrown to the pigs once a week, it is astonishing how quickly they will be devoured. Now I am not prepared to explain what part in the animal economy these ashes, charcoal, or sods play, but of one thing I am sure, that when they are supplied the pigs are heartier, they eat better, thrive better, and consequently pay better.

Let me mention a few of the general principles and close. We should always bear in mind that it is only with the best hogs that we can hope to make a profit. That the hog is a grazing animal and that exercise is essential to his well-being. That hogs that are being confined and highly fed, require a condiment of some kind to aid digestion. That the hogs should be salted, and the pens cleaned out as regularly as a cattle stable. That regularity is one of the first principles of good feeding. And finally, that there is no royal road to success, nor is there any secret receipt which will in every case ensure it; but the attention to, or the neglect of, these small details, each of which is of apparently small importance in itself, will decide whether the business will result in profit or loss, success or failure.

SELECTION AND CARE OF THE BROOD SOW AND YOUNG PIGS.

By R. Honey, Warkworth, Ont.

Since hog-raising has become such an important factor in our Provincial agriculture, too much care cannot be taken in the selection of the brood sow, as the foundation is the main part of the herd. I consider dairying an incomplete industry without hog raising as an adjunct. These two industries seem almost inseparable. The proper time at which to select the sow is while young, so that she may be raised in the right way. I do not intend to mention any particular breed, but some of the main points to be considered are: Procure a long deep sow with a light head, a tall one with short legs, not too heavy in the throat, deep in flank, broad between the fore legs giving plenty of room for heart and lungs, not heavy in the ear and having a good coat of hair on a thin skin. The dairyman looks for a flexible skin in a cow as an indication of a good milker and the same holds good with reference to the sow, as she must be a good milker to raise good pigs. This sow should have fourteen fully developed teats, as it is easy for ten pigs to suckle from fourteen teats but difficult for fourteen pigs to suckle from ten teats. In raising her, my idea is to have her grow rapidly on food that produces bone and muscle and not too much fat, as a fat sow is not a successful mother The food should consist of clover, roots, wheat bran, shorts, ground oats and whey or skimmed milk. I do not approve of corn, peas or rye, as they have a tendency to fat them. The sows should not be mated till about eight months old and then it should be with a thorough-bred sire, having a good pedigree. During mating she should be handled as quietly as possible to obtain the best results. Another requirement is plenty of exercise but not in snow banks as the snow injures the udder and the milk veins. She should be kept by herself to prevent injury from other stock. About ten days before farrowing place her in a warm well-ventilated pen, free from draughts, and with a fender around the pen about one foot from the wall and one foot high to prevent her injuring the young pigs. Bed with a little cut straw or chaff, as the young pigs get tangled in long straw. She should have free access to salt and be fed regulating food to prevent costiveness after farrowing. She should not have any grain for forty-eight hours, but should be given a warm drink with a small quantity of wheat bran in it as often as she gets up looking for something, as sows are usually thirsty. After forty eight hours commence feeding gradually with grain.

The next trouble will perhaps be the young pigs losing their tails. This is easily remedied by cutting the end enough to draw a drop of blood thus removing the inflammation from the root to the end. The young pigs should be taught as early as possible to take food. A good plan is to cut a sod two inches thick and turn it bottom side up in the pen, or in winter take dirt from the root house, and put down milk in a shallow dish apart from the mother. This should be done when they are from two to three weeks old. If raising the pigs for pork they should be castrated before weaning, say at from five to eight days old. They shou'd not be weaned before six weeks old. Great care should be taken during the next six weeks as the profit or loss depends largely on the feeding during that time. Feed liberally with succulent food, such as skim milk, shorts, bran, roots, etc. Remember, a stunted pig is dear as a gift and one over-fed with heavy grain is equally as bad, as it becomes foundered and ceases to make satisfactory growth.

THE PRODUCTION OF PORK.

By D. C. Anderson, Rugby, Ont.

Many farmers are complaining that they cannot make their farms pay, but when you get into conversation with them you will easily find the cause—they are farming on the old lines, raising grain for sale. The prices for coarse grain are not high and the outlook for a rise in price is not at all bright. Feed stuff of every kind is cheap, and the farmer who is depending upon oats, barley or peas as money crops, has found, of late years, that his lines have not fallen in very pleasant places, for he will have a hard struggle to make ends meet. Wages, insurance, taxes, fences, buildings, machinery, repairs, etc., all heavy items in connection with keeping the farm, are continually increasing. So that with a shortage in income and an increased expenditure there may be some grounds for the complaint that farming does not pay. Why should the farm be more unprofitable now than formerly? We know that twelve or sixteen years ago wheat, barley and coarse grains brought good prices; so did heavy horses and well finished beef cattle, but these were the good old days. However, the progressive farmer who is watching closely the ever changing agricultural conditions, and prepares to meet them, has no reasonable cause to grumble, for dairying and pork production are two profitable lines, in fact they are twin industries.

Lumberman's Pork. Some years ago the hogs that commanded the highest price were those which when dressed, weighed 300 pounds and over, and when cut up, showed on the side, four or five inches of pure white fat, without a streak of lean. The market for this was the lumber shanties. Strong, able-bodied, young men working amongst pine timber in the keen bracing winter air, had appetites for the strongest food. Bread, beans, fat pork and molasses, washed down with tea strong enough to float an egg, was the regulation diet in the old time shanty But fat pork and molasses have given place to fresh beef, butter and dried fruits. The heavy hog no longer leads the market, but has to give place to the modern bacon hog.

The British Market. Before the farmers of Ontario go too extensively into the production of pork, it will be wise to look for a market. The people of Britain consume imported hams and bacon to the value of about $57,000,000. In 1896, Canada exported to the motherland nearly $5,000,000 worth. Denmark and the United States supplies the great bulk of the bacon consumed there. Our bacon trade, however, has developed of late at an increase of nearly a million dollars a year, and if we can but produce a class of bacon hogs that when cured, will make a fine quality of breakfast bacon, suited to the British taste, there is great room for farmers to push this most profitable line of agricultural production. There are in this Province five or six lage packing establishments, some of which slaughter over a thousand hogs a day. There the quality of pork is graded by the thickness of fat it shows when split up along the shoulders and back. If there is more than two inches of fat, it is classed as No. 2, which sells at ten shillings per hundred weight lower than No. 1, or nearly two cents per pound less, retail. It will be seen from this that to get and keep a first place on the British market we must produce a long, lean hog, with good well developed hams, deep sides, the fat on the back and shoulder not to exceed two inches. In the matter of pork production and curing, there is a strong community of interest binding the packers and farmers together, for unless we produce and feed the right type of bacon hogs, it will be impossible for the packers to manufacture and cure a fine quality of bacon. I would like to see the men who buy from the farmers discriminate more sharply in price according to quality than they now do, for until this is done farmers will continue to produce the chunky, broad, fat backed, easily fed hogs that will, when cured, make only second-quality bacon.

The Brood Sow. My experience has been that by keeping Yorkshire sows and crossing them with the Berkshire, not only do I get profitable feeders, but also a good bacon hog. A cross between the Tamsworth and Chester Whites, or Tamsworth and Berkshire, gives good results both to farmer and packer. From experience and close observation, these cross-bred pigs prove grand doers, both in the pen and in the slaughter house. In selecting brood sows, they should be long and deep, with a strong back, but not a broad flat one, and not too closely coupled over the loin. Choose one with not less than twelve, and if possible with fourteen, teats. Don't choose her when she is running with the mother, but select her after she has been weaned. She will then have taken on her natural form, one that you can judge her by. If she turns out a good breeder and a careful mother, keep her until she is four or five years old. The constitutions of many of our herds have been permanently ruined by breeding from young immature animals. In selecting sows always keep a record of each time the sows are bred. Many a fine litter has been lost by the owner not knowing when to look for them. They usually go from 112 to 116 days. During this time the sow should have plenty of exercise. Never keep the brood sow confined in a close pen until within a few days of her time to farrow. She should have the run of the yard in winter, when the colts and cattle are not out, but don't allow her to make her bed in the manure heap, for laying amongst hot manure has a tendency to so weaken the sow that the young pigs will be neither robust nor vigorous. She should be well fed; there is no danger of her being too fat if she is fed on soft feed; never allow her frozen feed. If the sow is farrowing in winter she should be provided with a place free from frost, in fact she must have a warm pen if we would obtain the best results, and we cannot afford to take any chances; it pays to attend to the sow when she is farrowing, so give her a couple of chaff-baskets of cut straw or chaff as a bed. Be there to take care of the young pigs when they arrive, place them in a box or basket until they have all come, then put them to the mother for their first meal. It is now you will find the benefit of having fed the sow liberally on soft food, as she will have plenty of milk, and when once the young pigs have had a good meal they will not give any further trouble. When the sow is about to farrow don't give her any feed. After farrowing give nothing but a drink of warm gruel for the first twenty-four hours. Feed lightly for the first eight or ten days and gradually keep increasing until she is full fed, which will be in about two weeks. Castrate the male pigs when about four to eight days old, for if left till latter it will seriously interfere with their after growth and development. It is best to teach the young pigs to drink before weaning. To do this have the breeding pen so arranged that you can turn the sow out for a couple of hours. Just before letting her in give the little pigs some warm milk in a shallow trough; add a handful of shorts when they begin to eat well. Feeding the young pigs while on the sow will help to relieve her of the strain in sucking, especially if it be a large litter. When weaning leave two or three of the smallest pigs on the sow for five or six days after the others have been taken off. When weaned feed four or five times a day, for the first three weeks, scalded shorts and skim milk with a little linseed meal added as a laxative. In summer turn them on to a clover pasture and feed them twice a day on a mixed ration of bran, shorts and meal. If they are fed too much on heating foods when young, they will become constipated, which is too often the forerunner of many diseases in our swine. Avoid constipation in our hogs by feeding loosening foods or they will become paralyzed in the loins. In winter feed them potatoes, turnips or mangels boiled, and mixed with shorts and meal. Give them free access to salt and charcoal or hard-wood ashes mixed. Keep the pens clean, dry and warm. The sow should litter twice a year. If she cannot do this, better dispose of her and get a better. One such sow is worth more to the farmer than two that litter only once a year. The long period of idleness for the sow that produces young pigs but once a year is an unprofitable one to the owner. During the twelve months she will more than eat up all the profit her litter will make.

Summer Feeding. If farmers would experiment more they would be in a much better position to know what pays. It has been demonstrated that pork can be produced in summer, after the pigs are weaned, at a trifle under two cents a pound live weight, and in the winter at a fraction over two cents. I experimented with two litters of cross-bred pigs last summer. The two sows raised twenty-two pigs, the one farrowed on the 5th of March, the other about the 26th of the same month. The first litter was sold on the 12th of August and weighed within seven pounds of a ton. The price was five cents per pound live weight. Getting $100 for a litter of pigs, the progeny of one sow, at five and a half months old, is nearly equal to the best returns in the good old days. The other litter was sold in the middle of September; two of them were kept for home use; nine pigs of the litter brought $81; had they all been sold I would have received a little more than I did for the first litter. I kept a close account of the feed they consumed from the time they were weaned. These pigs were fed for three months on a mixture of shorts and bran and during the last five weeks were finished on pea meal and shorts. Feed was mixed with water twelve hours before feeding; no milk nor whey was used. I fed morning and evening and they had the run of a clover field. Cost of feed:

Two tons of bran	$18 00
Three tons of shorts	33 00
1,800 pounds of pea meal	18 00
Total	$69 00

Winter Feeding. Some years ago I purchased an agricultural boiler at a cost of $21. It has a capacity of forty-five gallons, and does not require much fuel, having a return flue. We feed in winter a mixed ration of turnips and peas, boiled together, in proportion of five bushels of pulped turnips to one bushel of peas. When cooked we mix amongst the hot food about seventy pounds shorts, adding a couple of handfuls of salt. We have in this a well balanced, easily digested ration. I have tried pulp turnips, meal and shorts mixed together, and fed raw, but the result was not nearly so satisfactory as with the boiled feed, especially in young pigs under 125 pounds. I am thoroughly convinced that it pays well to cook the food either by boiling or steaming. I find that the cheapest and most profitable winter feed is boiled turnips and shorts, milk warm, and no more than the pigs will clean up Feed three times a day. Two years ago I tried an experiment in winter feeding without boiled peas. I fed on cooked turnips and shorts and towards the close added pea meal. Two pens of ten pigs each, weaned, and fed from the 1st of November to the middle of April, consumed

500 bushels turnips at 6c. per bushel	$30 00
Three tons of shorts at $12 per ton	36 00
1,600 pounds of pea meal	15 00
Total	$81 00

The twenty pigs weighed (live) 3,840 pounds, or an average of 192 pounds each. It will be seen that on this ration it costs a fraction over two cents to make a pound of pork live weight in winter. The pigs gained about a pound a day, and when weaned averaged about 26 pounds. I had seventeen loads of rich manure, which well repaid the labor in boiling and feeding. I have two "crops" of hogs each year. The summer pigs are marketed in August and September, the winter ones in April, May or June. I keep them clean and give them a dry bed and plenty of straw. There can be no profit in keeping pigs squealing in a dirty wet pen. Avoid constipation by feeding loosening food, such as bran and clover in summer, and a cocked cheap bulky food, such as turnips, in winter. Pens built of lumber, double, with tar paper between, make a place quite warm enough. Give the brood sows exercise. By close attention to details you will find that the hog will give a better return for the food consumed than any other animal on the farm.

THE BACON INDUSTRY.

By A. C. Hallman, New Dundee, Ont.

It has been learned by experience that the fertility of the soil cannot be profitably kept up and at the same time sell the coarse grains grown thereon. By feeding stock and exporting the finished product in the shape of meat, the cost of exportation is reduced to seven-eighths, and in addition the fertility of the soil is increased instead of being diminished. The next point to consider is the kind of stock to keep. It is often remarked that it does not pay to bother with pigs; that it pays better to feed cattle. We claim that it costs less to produce a pound of pork than to produce a pound of beef. In order to prove this assertion we refer to such authority as Sir J. B Lawes, of Rothamstead, who when making some valuabie experiments some years ago found that the pig utilized 20 per cent. of its food, while cattle used but 8 per cent. It thus appears that the stock farmer has good reason to make a careful study of the proper management of the pig, which is one of his most fruitful sources of revenue. There is no other industry in this Province that has made such rapid progress and put so much cash in the farmers' pockets for the amount of money invested as the bacon trade has during the last decade. The hog has long been regarded by shrewd Americans as the mortgage lifter, but Canadians have been more backward in placing much importance on it. Looking back a quarter of a century it is wonderful to notice the difference between then and now as to the market requirements in the quality and form and in weight and age, in the number of hogs and the method of feeding, in the system of slaughtering and marketing. I find according to the latest bulletin issued by the Ontario Bureau of Industries, that the value of cattle slaughtered or sold amounted to $12,381,248; of horses, $2,712,884; of sheep, $2,646,-

709; and of hogs, $10,022.525. We also find that in 1882 the number of hogs on hand was 850 226, and in 1897 the number slaughtered or sold amounted to 1,399,967. We also find according to bulletins that while nearly all our live stock industries have decreased in number and money value, the swine industry has enormously increased. In 1877 only 144,000 hogs were exported, while in 1896 over 600,000, and that from 1890 to 1896 the increase was over 500 per cent. With these marvellous strides in the bacon trade it is yet in its infancy. We furnish the British market with only one-fifteenth part of the pork and bacon they consume. The Danes have by a close study of the British tastes, increased their exports in hogs from 230 000 in 1887 to 500,000 in 1897. They are now sending on an average at the rate of 22,000 per week. The United States, who had established a wonderful market for their hog product, are fast losing their grip, so also with their cheese, while we are fast gaining trade. The bacon produced in the United States is not of the high standard the British market demands; it is too fat. They have been careless in not catering to the British tastes.

The question will naturally arise, "Why all this change?" The whole secret in a nutshell is this: we are catering to the demands of the consumer, the British buyer. They are able to take all our surplus products and pay the highest price providing we furnish them with just what they demand. I would very emphatically impress on my fellow farmers the importance of furnishing the packers with what they require to supply the demand. We as farmers and producers must accept the packer as the indirect consumer. We find our packers shrewd, intelligent, wide awake business men, with a keen eye on the British market and with an enormous capital invested in their business, and all this for what they can make over and above the price of purchase and cost of handling. Many farmers have taken very readily to the requirements of the packer, which is seen by the great increase in the business. Yet we find many intelligent farmers who are so obstinate that they will not yield. Some will get a bacon breed, but will not feed correctly or market at right weight; others will insist on an old favorite breed, and are unwilling to give it up, claiming that they get just as much for their pig from the drover as their neighbor does for his so-called ideal bacon pig. There is only too much truth in this. The drover is much to blame. Instead of paying strictly according to quality he often buys from a farmer a bunch of hogs composed of light weights, prime singers, light fats, heavy fats, all at the same price, when he should have made from half a-cent to a cent and a-half a pound difference; then he goes to a neighbor and pays him the same price for all prime singers. Is there any wonder the farmer is careless and indifferent? Every drover who does this is dealing dishonestly with the drover and the packer, for he is obliged to take the difference in price as above at the packing house. Every hog that does not come up to the export standard is either rejected or taken at a reduced price. Does the packer discriminate? I say he does, and most severely. All hogs are classed by an expert (the drover has no say in it) weighed and re-weighed, prime singers taken out first; hogs that weigh from 160 to 220, if of proper type and fatness, bring the highest market price; all others, light, fat, small, large, heavy, etc., are taken at prices fixed by the packer. The prime factor in every legitimate business is the mighty dollar. The farmer is just as eager to obtain it as anyone, and has just as good a right to it. We all admit that it is the mighty dollar we are after in this business, from the producer to the manufacturer of prime bacon; then let us all join hands and do our part unselfishly. If a farmer has an uneven lot of hogs, let him sell what is ready and not insist on the whole lot going. Keep the light back until ready. It is the inferior quality, either too light or too heavy, that often floods the markets, and prime stock has to be sold for less than it is worth. If the farmer does this knowingly he is just as dishonest as the drover. I have been through the large cellars of a packing house when the manager pointed out the difference in the quality of bacon varying from two to three cents a pound, all in quality, either too fat, some too thin, or of improper texture. Using the manager's own words: "All this comes out of the farmer. We figure on a certain percentage of such sides and make the price of hogs accordingly. We are not the losers—the farmer is. Could we get just what we require we could well afford to pay the difference, and do a much larger and safer business."

The Style of a Pig. In discussing the style I shall not touch on breed, as this is treading on dangerous ground, although I believe the ideal bacon pig is confined to a very few breeds or crosses, and could give strong reasons for my belief. I shall not give my own ideas in describing, but make an extract from a description I received from a large packer; all the others I met agreed with it. "We want to make a bacon that finds a market in England. There is only one kind that will suit. If we send this kind we can sell it. If we send any that deviates from that particular standard we suffer by a widely depreciated price. We are in the market for the hog that makes that particular standard of bacon, that is, a long-bodied, deep-sided animal, with a small head, small shoulders, showing the same width along the back (not widening out at the shoulder nor narrowing in at the flank) and not too fat, nor yet poor and thin, weighing as near 180 as we can get it; the range of weights we allow for this particular hog are 160 to 220 lbs. We pay a higher price for this hog to the farmers right here on our own market. All carloads delivered by drovers are carefully sorted over and graded, the different kinds weighing by themselves and the price made accordingly. We pay the drover the highest price for all the hogs he has that come up to the above standard. We pay him for all hogs weighing the same, viz, 160 to 220 lbs. For those that are too fat, poor and thin, short and stubby, a lower price that varies with the market; to-day it is one-half cent per pound less. For all immature hogs weighing under 150 lbs. a still less price; to-day three-quarter cents less per pound. For all hogs weighing over 220 lbs., no matter how prime, three-quarters to one cent a pound less." The above needs no further comment; I wish that every farmer would make a close study of it. The farmers and packers' interests are mutual.

Another thing of very much importance is rearing and feeding. I will merely touch on this. We must remember the fact that swine are grass eating animals as well as our other live stock. This is very often forgotten. Right here is where the cost of production can be greatly lessened. We must develop lots of frame and muscle and strong digestive organs. Give plenty of exercise, grass, green corn. Green food of any kind, or vegetables, insures health. Always feed corn sparingly, and especially through the finishing season. Corn fed beef is what has given the Americans such a high place in the British beef market, and corn fed pork is what is largely ruining the bacon trade. The Danes have enjoyed a wonderful season of prosperity with their bacon trade up to about eighteen months ago. Last year they imported over 6,000,000 bushels of corn and fed it to hogs, and to-day are reaping the reward. Danish bacon is not so popular to-day as it was eighteen months ago. Let us profit by this. The British will not be imposed upon; they have their own tastes and will keep them. If they once lose confidence they are slow in regaining it. If we must import corn, let us feed it to our other stock, and feed our other grains, such as oats, peas, barley, middlings and bran to our hogs. All the mistakes of other countries help us to get a firmer grip on the British market, providing we are true to our own interests. Our bacon to-day stands very high in the estimation of the English people, and it is in our own hands to keep it there.

Remember that our bacon trade is yet in its infancy, that there is almost an unlimited demand for the right quality, not only in the British markets but also in our own cities. Our packing houses are all increasing their capacities, and new houses are springing up everywhere. Battenberg Bros., P.E.I., have just put up an establishment with a capacity of 250,000 hogs per year. The Winnipeg Company is enlarging its capacity. All this means more hogs, and let us furnish them the right kind. The Wm. Davies Company, of Toronto, sent a man to the eastern provinces last year to prospect for hogs and expect to get about 150,000 from New Brunswick and Nova Scotia. I fail to see why we should not be able to supply all these hogs. We have the climate and the feed, and our farmers have the necessary intelligence, the push and enterprise, and, above all, the finest Province in the Dominion.

THE BACON HOG.

By Thos. S. Henderson, Rockton, Ont.

Perhaps no animal on the farm has been of so great value to the farmer during the past year as the hog of the right stamp. He is called the singer—long, lean, and choice bacon hog. This result has been brought about by the great demand in the British markets for our cured meats. An idea may be gained of its growth by studying the trade and navigation returns since the year 1891, as the following table will show :

Year.	Quantity in lbs.	Value.
1891	7,150,756	$ 590,852
1892	11,544,295	1,094,205
1893	17,288,311	1.830,368
1894	26,826,840	2 754,479
1895	37,526,058	3.546,107
1896	47,058,784	3,802,269

The above is a splended showing and is for bacon only, and when we add to it the other hog products such as hams, lard, pork, and the live animals, we have a grand total of $4,563.883, for the fiscal year ending June 30th, 1896. I feel very confident that the trade has increased largely since that date. Hitherto, Ireland, and principally Denmark, had been supplying England with bacon, but we are making great advances, and so long as we are able to produce a good article we will be likely to retain it. We are a long way ahead of our American competitors. Our live hogs sell for about $1 per hundred weight more than theirs, and at the present time Mr. Armour, the great Chicago packer, has a man going through Ontario trying to find out what kind of hog we have got and how we feed him, in order to get this market we have established in Britain.

How I became I interested in this matter some years ago was while delivering a load of live hogs at Mr. Thos. Lawry & Son's packing house, Hamilton. I and a neighbor were called into the office, and Mr. Lawry read over to us about ten letters he had just received from their agents in the Old Country. All complained about the goods they were sending at that time as being too fat and would not sell. I said at the moment surely we could make them lean enough. Mr. Lawry then took us through the slaughter house, where a large number of hogs were hanging up just killed. They were cut down the back. We were shown the ones that would make the bacon so much in demand in England, laying emphasis upon the fact that when so cut down the back they would not show more than an inch of fat all the way down, except, perhaps, on top of the shoulder, which would be a little more.

What is this bacon ? It is what is called a Wiltshire cut, being the whole side of the hog with the head off, and cured in that way. There are other cuts such as hams, and the Cumberland cut, which is the side and shoulder with the ham and head off. But it is the Wiltshire cut we are more particularly speaking about. I am informed that it had its origin in Wiltshire, England, where the hair was singed off instead of scalding. I do not think that it is a better process, but as John Bull does not change his ideas very readily, our packers have to submit to singing so as to please him. There was an exhibition of five sides at the meeting of the Swine Breeders' Association held at Brantford during the week of the Ontario fat stock show. The good and bad points of these sides were ably explained by Mr. Chester Fearman, of Hamilton, and Mr. Wilson, of Ingersoll. I thought that it was an excellent way to educate the farmer along these lines as to what is wanted ; in fact, Mr. Fearman remarked that the packer and not the drover would have to teach the farmer.

The Kind Wanted. The hog required would have to fill the following points : two good hams ; long and deep sides ; narrow across the shoulder ; and a small head. The breed I prefer is the Tamworth, because he fills most of the points, especially the small head. The large, long Berkshire, and improved Yorkshire are very good. I think that it is principally among these three breeds and their crosses we will have to look for the bacon hog. A cross between the long, large Berkshire and the Tamworth makes a hog that will almost always fill the bill, at least I have found it so. Any of the small, short, thick, fat breeds will not do; they are simply lumps of lard. Lean, meaty animals are what the packers are looking for, and for which they will give the highest price. They can be furnished in large numbers by a judicious selection of the parents. "Like begets like," is a law of nature.

Care and Feed. This is a very important part of the question. We in Canada feed largely a mixed ration which has given our hog products a superior position over the American. Our meat is firm, while the American is soft and oily, caused by feeding an exclusive corn diet. My plan is to have a part of the pen divided off, with a small trough in it, where the little ones can go out and in at will. Put a handful of shorts in the trough, then pour a little new milk on them. When the pigs are about three weeks old they will begin to take the feed. This will greatly relieve the mother. She should be given all the milk-producing food she can take till the pigs are weaned, which should not be before they are two weeks old. When the young pigs take their feed well they should have skim or any other milk; the new milk is only to get them started, and they are not so apt to get scoured taking it. Time was when we used to let the pigs run all summer, and put them up to fatten in the fall. This is all changed now; we reverse that order and feed them best at the beginning of their existence. This is necessary. We must not allow them to get a set back about weaning time, as that will destroy our profit. Continue feeding them well until they are about three and a half months old, principally with milk, or whey and shorts, occasionally adding some ground peas and oats. Now begin feeding them roots, if in winter, and grass in summer, so that their ration will be about one-third milk, one third roots, and one-third grain. Peas and oats mixed, one-half each. Our object now is to keep them growing until they are about 200 lbs. live weight, when they should be sold. Care should be taken that they do not get too fat; if they should do so diminish the grain and milk and give largely roots, grass, or any kind of coarse vegetable food they will eat. They should be ready to go away when from seven to eight months old. That is the age Mr. Wilson told us they should be ready. A gentleman in the audience at the meeting at Brantford said he could have his at the required weight at six months. Mr. Wilson, of Ingersoll, replied, "Yes, but they would be too fat, and I think they would have to consume a large amount of costly food." I am of opinion that the best coarse food we can feed to the hogs is mangel-wurzel. Turnips will do, but they are not as good and would have to be pulped, while the mangels should be fed whole It will give them exercise breaking them. Some are feeding cut hay in winter, and I think it will answer a good purpose, although I have not tried it yet; others are using ensilage. Any of these things that the pigs will eat will do along with the other foods. Cheap production is what we want. At the Brantford meeting Mr. Fearman said that if he could get them he would like to have each hog weigh 187 lbs. when ready to kill, live weight. The weights at which they are taken now are from 150 to 220 lbs. Packers are opposed to feeding corn.

Exercise. Exercise is another important matter in connection with raising bacon hogs; they should have plenty of it. Our plan is to have the pens so arranged that we can let them out in the day time in summer and close them in at night; or, if thought best, the order could be reversed. On warm mild days in winter let them out about half a day at a time. By feeding mangels whole they will get a good deal of exercise eating them. Feed in a clean place; a sheltered yard would be preferable. Care should be taken not to let the young pigs go off their feed, especially in winter. Feed them bone and muscle producing foods; give them dry and warm quarters to sleep in, with plenty straw, when old enough to take care of themselves. Breeding sows should not be closed up at all, except a while at first. When they have a young litter, the more exercise they take the better.

In summing up the whole question, the great essentials are the proper shape of the bacon hog and correct feeding. Be sure and bear in mind that they must not have more than an inch of fat on the back.

SWINE BREEDING AND FEEDING.

By Robert Thompson, St. Catharines, Ont.

The pork packing industry is one which every farmer can have a share in, no matter how humble his circumstances. It is one also in which the farmer who does business on the largest scale finds advantageous in connection with his dairying, beef-production, fruit growing or general farming. Farmers should continue to devote more attention to the raising and feeding of hogs for the packing establishments. There is less danger of overdoing the market with the right class of pork than there is with other products of the farm. If we can go on improving the quality of our products and making it year by year more acceptable to the tastes of the foreign consumer, there is no doubt that the export trade which we have already established, and which has increased very rapidly, will yearly grow greater. We have plenty of room for expansion so long as we keep the quality up to the standard.

Our total contribution to the British bacon market is only a fraction of what that market demands. If we are careful to keep improving the quality of our product, our exports to Britain ought to increase enormously. If we can raise hogs and feed our coarse grains and roots to them and sell the hog products for enough money to give us market price for the food consumed, we will have the grain marketed and the manure to enrich our farms to grow more grain to feed more hogs. Our aim should be to feed our hogs as cheaply as possible per hundred weight, to reach the weight desired by our buyers and also the desired condition as to quality.

Success in swine breeding depends, not so much upon the breed as upon the "right stamp" of the breed, and the right management or treatment after having secured the right stamp. There are bad, good, better and best in all the breeds. Almost any of the sorts can be so improved by selection as to come near enough to the desired type for all practical and profitable purposes. My decision after long years of experience, is that the Berkshire makes the best mother to cross with Tamworth, or if not able to secure a Tamworth then an improved Yorkshire. If, however, the corn-growing farmer thinks that all he has to do to produce bacon pigs is to get a number of Tamworths or Yorkshires and raise them in the same way he did large hogs, he will find that it will only be a matter of a few generations until he will have another lard hog. I place great importance on allowing the hogs exercise during the winter, and a run of clover or orchard during the summer, feeding ground grain and boiled roots or potatoes to the small pigs until they reach the age of three months ; after that time, pulped roots and meal mixtures, putting a little salt in the food regularly. I find it pays to lay in a large supply of old sods in the fall and throw some in to the hogs every day. It is of very little difference at what season of the year the pigs are farrowed if one has a warm pen ; but for the great majority, I believe that there are two seasons at which it is most profitable to have pigs farrowed, that is, in early spring and early autumn. Pigs farrowed in March or April can soon be let out for exercise, for even the little pig "wants the earth," and may be fattened for the early fall market. Those farrowed in September, or even early in October, have sufficient time to develop weight, bone and constitution before cold weather to stand confinement during the cold winter wonths. As a rule, sows should not produce a litter before twelve months old, and I always keep my sows until their usefulness is gone. Those three years and older generally make the best mothers The little pigs should be castrated while on the sows, when from five to eight day's old. I have on several occasions kept account of the food consumed by litters of pigs, and after paying or charging against them market prices for grain and roots consumed, and placing the value of the pigs at two dollars each at seven weeks old, I have determined to continue to raise from forty to sixty hogs per year, even if prices run lower than the lowest price reached in late years.

SWINE BREEDING AND FEEDING.

By John C. Nichol, Hubrey, Ont.

In these days of small profits, the industry which gives the quickest and best returns for the money invested, is the industry which commends itself to the majority of farmers. Such an industry we have in swine breeding and feeding. Swine breeding and feeding, by many, does not receive the attention that it should; the force of this statement will be seen when we consider and compare the prices of feed and pork: Peas, oat and shorts (which make very good feed for making pork) at 65 cents per cwt. and one pound of pork can be made from four pounds of feed, some claim from even less. Then one hundred pounds of pork only cost $2.60, and we sell our pigs at $5 per cwt. live weight, thus deriving us a profit of $2.40, less the expense of keeping the sow, which is but a small item when we consider that a good sow will raise twenty pigs in a year. These twenty pigs when sold at two hundred pounds each, would give four thousand pounds, which at the price quoted would give a profit of $96, the product of one sow. Of course prices fluctuate, feed gets high and pork gets low, and again pork gets high and feed gets low. But I think the present prices are a fair average, so that we may depend on swine breeding and feeding giving us a good margin at almost any time.

Some people do not like to feed pigs. Well, if you don't like it don't do it, for it is not likely you will make a success of it; turn your attention to something else. The pig, which is such a common animal with us, is, perhaps, the least understood of all our domestic animals. It is thought by many to be the most stupid, greedy, lazy and dirty animal that we have. Now it has been proved that he is as capable of receiving instructions as the ordinary dog; indeed I believe that the pig is the most intelligent of all our domestic animals, unless it is the dog. As to his greediness, it is only showing his willingness to turn our coarse grains into money; the greedier a pig is the quicker he does that; a pig that is not greedy for his feed is not a good pig. As to his laziness, it can be truthfully said he is not guilty of that; whenever he is in need of anything he goes and looks for it, instead of being like some men, "waiting till it turns up." And instead of being dirty, he is the cleanest animal that we have; give him half the chance that you give your horses and cattle and see how clean he keeps himself. The first requisite to profitable swine breeding and feeding is good comfortable quarters for the pigs. It used to be quite common to see pigs penned up in a corner of a snake fence, and when it came a wet time, the only place where the poor brute could get to be dry, was the trough. Even yet we often see pigs housed in places where the storm has free access. The snow drifts in on them, and the owner wonders why those pigs can't keep their bedding dry. Men will build expensive and comfortable buildings for their horses and cattle, and leave their best friend, "the mortgage lifter," to shift for himself around the straw-stack, or, what is worse, shut him in a cold drafty place on the cold side of the barn. I was at a farm some time ago where the cattle and horse stables were all that could be desired for comfort and convenience, but on the west side of the barn, in a lean-to, open to the west, were about twenty pigs (about twenty-five pounds each although they appeared to be three months old) fenced in a pen 10 feet square, no bedding, lying in a heap and trembling with the cold. I thought, here is a case for the Society for the Prevention of Cruelty to Animals. Pigs do not need an expensive building, but they need to be kept dry and free from drafts, and also have good ventilation. If swine are kept in a damp place, be it ever so warm, they are apt to contract a cough, which all swine breeders know is a troublesome thing, and for this reason I think a frame building is better than a stone or cement. A stone building is always more or less damp. Swine pens should always be supplied with pure air. Some people have the idea that the filthier the pig is the better, but this is a great mistake. All fattening animals especially, require well ventilated pens, and pigs more than any other animal as they lie with their head close to the floor, thus breathing the air from where it is more liable to be impure. All pig pens should be supplied with a yard for the pigs to exercise in, as exercise is a very necessary thing for the health of the animal. The question of shelter should be the first consideration, for without that we may have the best pigs of the most approved breeds, and we may feed ever so judiciously, but if our feeding has to go to supply warmth only, we lose all our trouble and expense. I am not going to advocate any particular kind of pen, but in building pens each man should study to have the feeding and cleaning arrangments as convenient as possible, for there are two things we cannot afford to waste in any kind of stock-feeding, if we would make it profitable, namely, "time and feed."

Next thing in importance is the brood sow. She should be of a quiet disposition. Some people thing that pigs are all alike, but they are not; there is as much difference in them as there is in any other kind of animal. She should be long bodied, long ribbed, with medium long neck, deep flank, wide between front legs, strong boned, strong haired, a well sprung belly, standing straight on her feet, and have twelve or more good teats; these traits should be inherited from the dam. In choosing a brood sow there are two quite common times that people choose them, when the pigs are sucking the sow, and when they are fattened ready for slaughter. Now these are both wrong, for when a pig is sucking the sow, if the mother is a good milker, the pig will be nicely rounded with fat, and be as "pretty as a picture," but after it is weaned it might develop into a different looking animal; also when a young sow has been fattened, her breeding propensities are apt to be spoiled, or if she does breed, she will likely have small litters, and she being educated to fatten will take nourishment mostly to herself instead of giving it to her offspring. The best time to choose a brood sow is when she is between three and four months old; she is then developing into the style of an animal that she is going to be. Spring litters are the best to choose from, as they usually have the best chance to develop.

Next thing is preparing the sow for the great strain that is to come on her, nourishing and bringing forth her young. For this we must feed her on bone and muscle-forming food. Oats and barley chopped fine, mixed with bran, with, in winter, a few mangels, and plenty of exercise, and in summer, clover pasture. A sow will breed when four months old, but it is better to let her get about eight months, as she will have a chance to be better developed. Then a very important thing is to see that the sow is in a healthy condition at the time of breeding, and she should be well developed, but not too fat. Always use a pure bred sire. Now, as to the best breed, it is enough to say that there is no best breed for all purposes, but one thing is certain, that some breeds of swine conform more closely to the pork packers' views than others, and we must cater to the export trade, which requires a pig about 200 pounds weight, with long deep sides, together with a good deep ham; and experiments show that there is very little difference in the cost of producing pork from the different breeds. Indeed they show that some of the bacon breeds can be produced cheaper than the lard breeds. After your sow has been bred there is a small thing you should notice which may mean a great deal—see that your sow is free from lice. I don't care how careful the owner of the stock boar is, the boar will get lice from coming in contact with sows which have them. A dose of some kind of insect destroyer at this time may save a great deal of trouble. A good thing for this is black oil. Take a little oil in a can and pour hot water on it, you can then apply it with a brush or cloth. This is a sure death to lice and it also softens the skin and promotes a healthy growth of hair. While the sow is pregnant she should have plenty of exercise and free access to salt; see that her bowels are kept open and regular. A good feed at this time is chopped oats and shorts with a few roots; gradually leave off the roots toward farrowing time. Let your sow get acquainted with you. Fondle her and let her know that you are her friend; no animal feels more at home with her keeper than a pig if kindly treated. She may need you when the critical time comes, and unless she is accustomed in having you in the pen with her, you will likely do more harm than good. About two weeks before farrowing time the sow should be put into a pen by herself in order to get used to it and not be fretful; she should have a limited supply of fresh short bedding. The pen should have a rail around inside about ten inches from the floor, so that if the sow lie down with her back toward the side of the pen, the little pigs can slip under and thus avoid being laid on. Avoid feeding fattening or heating feed at this time. If your sow should be constipated, better give her a dose of salts. This is the most common cause of sows eating their pigs. If they are fed on strong or heating food it causes a fever in the system resulting in milk fever. This is very important at this time. Some of the American breeders claim that the sow should have a good big feed just before farrowing, but I do not think this is good. It might do very well with sows that have from three to five pigs at a litter, but with our sows that have from ten to twelve pigs, I think it would be very injurious. If the sow is left to herself she does not look for it, but will work for half a day sometimes making her bed, seeming to have no desire for anything but an occasional drink of water. After farrowing she should have nothing for twenty-four hours but a drink, and be fed lightly for the first two weeks, gradually increasing the feed as the pigs require more milk. When the little pigs come they have six teeth, which they have no need for, two on each side of the upper jaw and one on each side of the lower; they are usually black. In fighting for the teat they often cut one another badly with them also making the teat so sore that the sow will lie on her belly and refuse to let them suck. It is always best to pinch these teeth off close to the gum and the pigs will thrive better without them. Another common ailment with young pigs is scours. This is usually caused by an excessive supply of milk from the sow. To avoid this, feed the sow sparingly and increase gradually as the pigs need more milk. To stop pigs from scouring, a good thing is to give the sow a tablespoonful of copperas dissolved and mixed in her slop. This should be attended to at once, as they will not thrive when they have the scours, and a few days lost on the little pigs means a good deal on the pigs' lifetime. By the time the pigs are four weeks old they cause a heavy drain on the sow. A sow during twenty-four hours will give as much milk as a good cow. When the pigs are farrowed a common weight is three pounds (although we quite frequently have them weigh four); a litter of ten pigs will then weigh thirty pounds, and when they are four weeks old, if they have been well nursed, they will weigh eighteen pounds each, making a gain of 150 pounds in twenty-eight days, or the sow producing an average of five and a half pounds per day. So that you see the sow should be a milker and be fed with an eye to milk production. The young pigs will sometimes commence to eat at two weeks old, but usually about four. If you have only a limited supply of milk to feed them, it is a good plan to set a shallow trough where the sow can't get at it, and the young pigs can, and feed them milk, or they will do very well on scalded shorts mixed with a thin slop; They will, in this way, gradually learn to be self-dependent.

Castration should be performed before the pigs are weaned. They should be weaned at seven or eight weeks old. You can then breed your sow for the second litter; she will usually be in heat about the fifth day after weaning the pigs, but if the pigs are left with the sow a long time she will sometimes come in heat before the pigs are weaned. Don't starve your sow at this time. You may have to let the pigs suck her out once or twice, if she is a good milker, but if you can have your sow gaining she will be in a better condition to start her work again. The young pigs should be kept growing right along. They like changes in their food, but avoid sudden change, as it is apt to cause constipation. They should be fed on light bulky food, such as shorts, but if the shorts are good, mix a little bran with it. Oats are good if the hulls could be got rid of. It is also good to give a few ears of corn once a day, thrown on the ground (if the ground is clean), so that they will scramble for it. Ashes and salt should be kept within their reach at all times. It is also necessary that they should have a clean dry bed; wheat straw is the best bedding. Keep your pigs growing just as fast as they will, until they are about three and a half months old, then gradually change to more fattening food. It is very essential that pigs should be kept growing. It takes a certain amount of food to sustain life, and if the pig gets no more then that, he comes to a standstill and it is just so much feed wasted. We hear men say: "Oh, I am wintering my hogs cheap, running them over on turnips." A few turnips fed to a growing pig, I believe is good (mangels or sugar beets are better), but when roots are fed as a principal diet, it is a waste of both time and feed. Turnips are supposed to be ninety-three per cent. water, so that the pig (which has a very small stomach) has to take about five pailfuls of water to get as much food as it should have in one day. We hear a good deal about pigs getting lame when they are about 100 or 120 pounds weight. The pig's life is largely an artificial one. In fattening we feed more than the stomach can naturally assimilate, therefore we should assist the stomach. Charcoal is the best thing I know of for this purpose. I use corncob charcoal. I make it in this way. I dig a hole in the ground about three feet deep. I then put a fire down in the bottom and by degrees add the cobs, first four or five inches deep and when that gets all aglow add more, and so on until the whole is full, then place boards across the top and cover closely over. The fire then dies out and leaves the cobs all nicely charred. Take five bushels of this charcoal and dissolve one pound of copperas, sprinkle this on the charcoal and add about four quarts of salt and one bushel of shorts and five pounds of sulphur and mix thoroughly. Give some of this every day and you will be astonished how greedily they will eat this: they will even leave corn for it. You will also be surprised at how much better they will thrive, and you will not likely be bothered with much lameness. An almost sure cure for muscular lameness (which is usually caused by indigestion) is nux vomica and gentian, equal quantities of each, one teaspoonful for a pig of 100 pounds weight twice a day for two days, then miss two days, and if the pig is not better repeat as before.

As to feeding, I prefer feeding wet instead of dry feed. Theodoro Louis, of Wisconsin, a Dutchman, and a great authority on swine, in a lecture was advocating dry feed, when a farmer in the audience jumped up and said: "You are all wrong, it takes the pig too long to eat dry feed" "Ish dat so," answered Louis, "Vill you tell me, mein frient, vat ish the hog's time worth?" But I believe the pig's time is worth something. It is not natural for pigs to eat their food dry. In his natural state he lived on grass, nuts and such roots as he could dig out of the moist earth. I don't think he can take enough food in a dry state. We should feed him in the way that he will take the most feed, and then help him to digest it. The feed should be mixed enough for a day at a time; clean out the swill barrel every day in summer, never allow it to get stinking, much less the trough. Feed no more than the pigs can clean up. I prefer V troughs, as the pigs can clean them easier than the flat ones.

As to the best kind of feed to fatten pigs, peas and barley are perhaps the best, but peas are usually too expensive. A cheap and very good kind of feed is shorts and chopped corn mixed, equal quantities, with clover pasture in summer or a few sugar beets in winter. Treat your pigs kindly, it will pay you. Don't have more than you can keep in good growing condition, and remember this, "The pig is a sure rewarder to those that hold him in esteem, and to him that intelligently cares for him and feeds him great profits shall be given."

DAIRY DEPARTMENT.

A DAIRY EDUCATION.

By H. H. Dean, Professor of Dairy Husbandry, O.A.C., Guelph, Ont.

> "Just experience proves, in every soil,
> That those who think will govern those who toil."

The world to-day needs *thinkers* as well as workers. Some are content to work, and allow others to do the thinking for them. Some think, and compel others to do the work. In Canada we need these who combine thinking and working. The dairy industry, especially, needs such persons. He or she who deals with animal life and animal products needs a more liberal education and more skill than the person who deals with vegetable life and products. The lower form of life is utilized to sustain the higher. The dairy cow is a highly organized form of animal life. She is also a form of artificial animal life, made so by man, and, in consequence, needs a superior person to attend her and supply her wants. Natural conditions are no longer consistent with her acquired habits. The cowherd who exposes his charge to snow, sleet, and cold rain, hot sun, flies, scanty food, or gives her cruel treatment, fails in the essentials of successful treatment of the dairy cow.

In the handling of cow products great strides have been made in recent years. The setting of milk in "six-penny" or "shilling" crocks has been superseded by the modern creamer, and this again by the cream separator. Each step in advance requires more skill and forethought, but if these are lacking the modern methods become a hindrance rather than a help to the dairyman.

The markets of the world are more exacting each year. None but goods of the finest quality will pay for exporting, and the home markets are each year more critical. More intelligent and more skilful makers of dairy goods are asked for now than formerly. In addition to being able to make good butter and cheese, men who manage factories are supposed to be able to make out invoices of goods shipped, to keep accounts, to figure fat due patrons from weight of milk and test, to test milk, cream, etc, with the various testers, and above all to keep things in and around the factory in the most cleanly and orderly condition.

The farm dairy also requires a certain amount of attention. We all trust that the creamery system of butter-making will soon become as general as the cheese factory system, but for some time to come there will be considerable butter made in private dairies. These home dairy products should be of the finest quality, especially for the farmer's table. Good butter supplies the oil which makes the family carriage run smoothly, while bad butter clogs the wheels, causing family jolts and jars. As a lubricator of the brain nothing equals fine cream and butter. As a muscle-builder, what is equal to good ripe cheddar cheese?

The more brain power put into the manufacture of good butter and cheese, the more brain power will be produced in the world. The more milk, cheese and butter consumed by all classes, the more energy and muscle will there be to expend upon the world's progress. For the production of energy to do work, nothing equals the products of the dairy for economy.

In order that readers may have the information most generally asked for in reference to the dairy school in connection with the Ontario Agricultural College, where a dairy education is given to all who attend and apply themselves, a few of the more commonly asked questions are appended, together with their answers.

Q. When does the next course open?

A. January 4th, 1899, and will continue twelve weeks.

Q. What does it cost to take a full dairy course?

A. Your railway fare to and from Guelph. Board at $2.50 to $3 per week; two suits of white clothes, $2.50; laundry, $2; incidental expenses, $5. Total, $40 to $50, not including railway fare.

Q. What books are required?

A. A note book for taking down lectures and discussions. The dairy library contains all the latest works on dairying, and the books are for the free use of students. In addition, all the leading agricultural and dairy journals are kept in the reading-room. A few of the best works on dairying should be purchased by students who wish to be especially well up in the business.

Q. What benefit will it be to take a dairy course?

A. If you are a cheese-maker, you will pick up many useful hints on your work, as the instructors are the best practical men available. The instruction in milk-testing is very helpful, while a knowledge of butter-making is an essential part of a cheese-maker's training in these days of winter creameries in cheese factories. If you are a butter-maker you will receive instruction in the running of the leading cream separators, pasteurization of milk and cream, making starters, ripening cream, churning and preparing butter for export and local markets. If you are making butter in the home dairy, you will receive lessons in setting and skimming milk, operating hand cream-separators, churning and printing butter. A week or more could be profitably spent by many farmers' wives and daughters. A lady instructor gives special attention to ladies. The lectures on poultry are valuable to the home dairy student. If you are simply going to farm, and never expect to make any cheese or butter yourself, the course will broaden your views. The lectures on feeding, breeds of cattle, swine, and poultry, cultivation of the soil, best varieties of grains, grasses, clovers, corns, roots, etc., horticulture, veterinary, and the various agricultural sciences will be a great help to any one on, or interested in, a farm.

Q. What experience is required?

A. No experience is absolutely necessary, but, if you intend taking the factory course, it would be better to spend, at least, one season in a creamery or cheese factory before taking the course. For the home dairy course a factory experience will be of no special advantage.

Q. What work will be required during the term?

A. Each student is expected to do his or her share of all the work in the dairy, including the washing of all utensils, scrubbing floors, and keeping the dairy in a tidy manner. It is the duty of the instructors to see that all work is done in the best manner possible.

Q. Are students paid for their work?

A. No. As practically no fees are charged, the work done by students is a very small return for the expense of conducting the school. Regular college students who work upon the farm are credited on board for work done, but dairy students board outside the College in private houses or hotels, and are not paid for any work which they may do as it is a part of their instruction.

Q. What are the chances for obtaining a situation after taking the course?

A. All our experienced students obtain places each year, and most of those who have had no experience obtain positions as helpers in factories and creameries. We always have a demand for more men competent to manage factories than we are able to supply.

If young men and women will qualify themselves there is ample room in the great growing dairy industry of Canada.

Q Where may circulars giving full information, and forms of application be obtained?

A. From Prof. H. H. Dean, Dairy Department, O.A.C., Guelph, Ont.

WHAT A DAIRY SCHOOL COURSE MEANS.

By Bella Miller, Guelph, Ont.

Truly many have been kept from dairy school because they felt that they could not afford it, but more have kept away because they did not know what a dairy school course meant; and, if it were better understood, the question would change from "Can we afford it?" to "Can we afford to miss it?"

No farmer would go to the expense of buying a binder if he thought he would not be a gainer by so doing. Neither are factory men nor dairy maids going to take a course at a dairy school without seeing where they, too, will be benefited. Many people believe that a dairy school is a place in which to learn to make butter, and as they have made it for years, it is a rest from such that they are now wanting. I am talking to the wives and daughters of our farm homes. How many would not like to leave butter-making, and all other kinds of making, and fly away into a larger world if but for a short time? Let us see if we cannot, through the dairy school, see the world larger. Ontario is proud of her three excellent dairy schools—Strathroy, Kingston and Guelph—each school having energetic, painstaking and progressive instructors, and, by the large attendance, we feel that the cheese-makers and creamery men realize their need of training. The farmers' wives and daughters have attended in but small numbers as yet, but if they will come with me we will imagine we are taking a holiday and are visiting the Guelph Dairy School. The definition given for a dairy school was right as far as it went, but let us see if it should not go farther. We find that the class is at morning lecture, and, until the day's work begins, we will wait in the ladies' sitting room which is so pleasant and comfortable. We sometimes read in the newspaper someone's account of their visit to the Dairy school, and although they excellently describe the practical work, the valuable lectures are often forgotten to be mentioned Should not theory and practice go hand in hand when theory is just a setting forth of the probable results which will follow from any particular line of practice?

While we are waiting let us look at some of the subjects presented at these morning lectures. "The composition of milk." Did you ever think of the value of the different parts, or of the difference between butter fat and fats used in the manufacture of oleomargarin? "Dairy farming." A dairy farmer has many advantages, but to be successful he must use good judgment along many lines. The "Feeding of our dairy cows" is an important subject, for when we consider the food cost of producing a pound of milk, butter, or cheese, we find it possible to feed without benefiting our pocket-books, and no one wants to do that. The silo is becoming more important each year, and how to build it, and what to put in it should interest all who keep stock. Those who send their milk to a cheese factory or creamery will be interested in the talks on the "Methods of dividing proceeds," and we all ought to be interested in the position we hold in the British market, and the different countries with which we have to compete. But we have touched just a few of the "Dairying" subjects, and will now look at that interesting study "Bacteriology," and its great importance in dairy work. Certain kinds of bacteria are necessary for cheese and butter-making, such as the lactic acid germs. These germs split up the milk sugar into lactic acid. This acid gives to the cream we are going to churn the desirable sourness. But there are many kinds of bacteria that are undesirable, and with care and cleanliness they may to a great extent be kept out of the milk. It is necessary that not only should the dairy utensils be clean, but the stables, cows, and milkmen, too. Just another word on this subject. We have all heard of tuberculosis, that dread disease which is the same whether in animal or man, and can be transmitted to man by means of milk, but perhaps we have not thought how easy it is for other contagious disease germs to gain admittance to milk, and there rapidly develop. Much more might be said, but we will now change the subject.

I am sure you ladies are interested in the poultry, and such talks as "Poultry for Profit," "Diseases of Hens," and in fact any of the talks on this subject will prove helpful, as also will the talk on "Flowers." Everybody loves flowers, and as they can be grown successfully in the factory window as well as in the home, the methods of propagating, potting and watering the different species interests all. "The Farmer's Fruit Garden" is the subject of a talk that should help us, and who by planting a "succession" need be without berries with his cream. Each farm crop, the berry bushes included, has its insect foes, and how to destroy them we should all want to know. All the lectures are illustrated, but perhaps the most novel to a large proportion of the students are those in the chemical laboratory. "How to restore and maintain soil fertility," and many other subjects profitable to farmers and dairymen we might mention, but time is up, and we will now go down stairs. Cleanliness and courtesy go hand in hand down there. That great lesson of cleanliness is impressed in every department and it is one of the most important points in successful dairy work.

In each department you will notice how fully and pleasantly all questions are answered, and how interested the students are in their work. Shall we go to the home dairy first? The ladies will be most interested in that. Already I hear someone say, "It is all very well to make good butter here, you have every convenience." I know things are convenient, and a few of those labor savers, such as a drain in the floor and a lever butter worker might be had in many homes at small expense. It is the seemingly little things that count, and the great importance of the thermometer is thoroughly emphasized at the dairy school. In the home dairy the training is such as the name implies. In this department butter-making is taught, also the setting and skimming of milk, the running of hand separators, and the testing of milk by the Babcock tester. Samples of skim-milk are tested to show the difference in the loss of fat by the different methods of creaming, and the importance of knowing what each cow is doing for us is a point emphasized here. The different methods of salting butter are illustrated, and there are other points we might mention, but we will pass on to the large dairy. Here we see work on what we may call a factory scale. The large churns are run by power; the centre churn, being a combined churn and butter worker, must prove a great convenience in warm weather.

On the raised platform are the cream separators, three run by belt power and one by a turbine. We hear much in the present day about the pasteurizing of milk, or making it germ free, and a Reid's pasteurizer and a milk cooler have been provided for this department. It is in that twin vat the cream is ripened for churning, but the morning is passing quickly and we want to visit the milk-testing room before dinner.

Here are several Babcock testers for determining the per cent. of fat in milk and its products, and also lactometers, which in connection with the "Babcock" tell us if milk has been adulterated and to what extent. There are other methods of testing, but we need not mention them as there is yet another room to visit. The cheese room is a place of wonder to anyone who has never made a cheese. How the liquid milk becomes a hard, solid cheese has puzzled many. You ask why these rows of seats in this room? They will all be occupied shortly. Each afternoon an instructor talks on his own particular work, and discussion on the subject in hand is invited. Under the head "cheese-making," comes the proper handling of milk, the making of cheese in the different seasons of the year, and special points to be noted when dealing with milk that is over ripe, tainted or grassy. "Butter-making" is also fully discussed, beginning with when the milk is drawn from the cow and ending when it reaches the table of the consumer. "Separators," a subject which seems hard for many to understand, is made very plain, and gives a person a new and greater interest in all machinery. When speaking of machinery, we must not forget the interesting talks on pulleys, valves, etc. An hour once a week is spent in the live stock class-room, where animals of the different dairy breeds are brought in and their points discussed. The "Scoring of Butter and Cheese" is another pleasant hour each week, and much is learned about the different flavors and what produces them.

A great many of the best things I have forgotten to tell you, but you will come and see for yourself. You have heard the old song:

> "Could a man be secure
> That his days would endure
> As of old, for a thousand long years,
> What things might he know!
> What deeds he might do!
> And all without hurry or cares.'

But this is a fast age, when we all seem to be on a time-limited express looking out for short cuts, and I think the three months' course at the Guelph Dairy School is one of these. The many subjects touched on in the best possible way open up new avenues of thought, and make life fuller and broader than it was before.

NOTES FROM THE DAIRY DEPARTMENT OF THE ONTARIO AGRICULTURAL COLLEGE.

By H. H. Dean, Professor of Dairy Husbandry, O. A. C., Guelph.

How the Per Cent. Fat in Milk Affects the Yield of Cheese. There are still some who maintain that it is just to "pool" or divide money among patrons of a cheese factory according to the weight of milk. The following tests conducted in the Dairy Department of the Ontario Agricultural College show how far from justice this plan is.

Three hundred pounds of milk testing 4.35 per cent. fat, produced 34½ pounds of green cheese and 33 pounds of cured cheese. On the same day and under the same conditions of handling, as far as possible, three hundred pounds of milk testing 3.15 per cent. fat, produced 27¼ pounds of green and 26 pounds of cured cheese. A difference of 1-2 per cent. in the fat made a difference of 7 pounds in the yield of cured cheese, from 300 pounds of milk, or at the rate of 2⅓ pounds per hundred pounds of milk. At 8 cents per pound of cheese it makes a difference of about 18 cents per 100 in the value of this milk for cheese making.

Another good illustration will suffice. This time we had two vats of milk, 300 pounds in each, one of which tested 4.00 per cent. fat and the other 3.1. The yield of cured cheese from the former was 30½ pounds, and from the latter 26¼,-a difference of 4¼ pounds. We have numerous instances where the difference is as great or greater than in the cases cited, which go to show that all milk should be tested as it comes to the factories, and the proceeds of sales divided according to its cheese making value and not according to its bulk.

Different Methods of Creaming. For three years the Dairy Department of the College has been experimenting as to the best method of creaming milk so as to get the most butter of the best quality from a given quantity of milk. Our plan has been to mix the herd milk well, then divide it into three equal portions and set one-third in the small shallow pan, one-third in deep setting cans in ice water, and one-third is run through the separator.

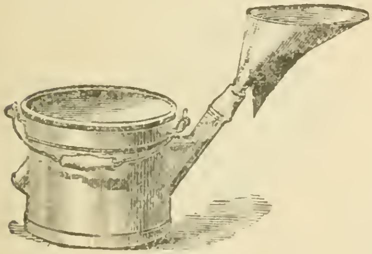
The average per cent. of the total fat lost in skim and butter milk during 1893 and 1894 was 2.35 from the separator, 6.1 from deep setting and 9 05 from shallow pans, or in other words for every 100 pounds of butter fat made we lost about 2⅓ pounds of butter by using the separator, 6 pounds by the use of deep setting cans in ice water, and 9 pounds by using shallow pans. The loss from setting methods is greater in hot weather. The quality of the butter is not so good from shallow pans in hot weather, whereas in cool weather it is fairly good and compares favorably with deep setting and separator butter. In 1895 the results from the three methods during the month of April, May, and June were 50 lbs. 6 oz. of butter from the separator ; 49 lbs. 11 oz from deep setting ; and 48 lbs. 2 oz. from shallow pan. The loss of fat in the buttermilk was slighly greater from the setting methods. To show how small things affect milk setting in shallow pans, I would mention the fact that one day a window was left open so that there was a draught blowing on the milk. This cream was tough and when strained into the churn there was fully ¼ of a pound of butter in it that would not strain because of the lumps of cream.

Lesson.—Milk setting in shallow pans should not be exposed to any draught of air but should be kept in a cool and comparatively moist place so as to prevent drying of the cream. But dampness and mould usually go together, and the latter must be guarded against.

UTENSILS AND APPLIANCES ADAPTED FOR PRACTICAL USE IN A FARM DAIRY.

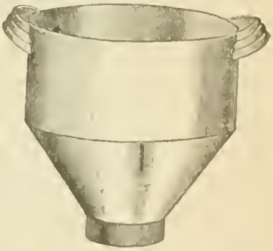
By T. C. Rogers, O. A. C. Guelph.

Give any kind of a mechanic poor tools and he will do inferior work and less of it, besides it will make his work unpleasant and unprofitable to him. If the farm dairy is fitted with an insufficient supply of utensils and appliances of poor quality, similar results may be expected. A few suggestions regarding the best kind of utensils to select may be of value to those wishing to have a good dairy outfit.



The perfect Milk Pail.

Dairy Pail.

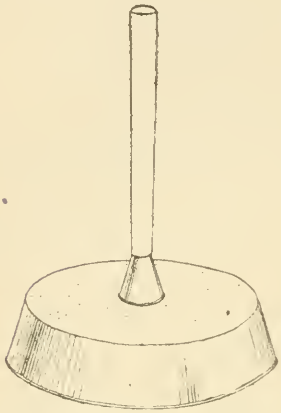


Milk Strainer

For milking purposes a 10 or 12 quart tin pail is the best. Wooden pails should not be used. But for general use about the dairy, the pail shown above is ideal ; no dairyman would be without it if he knew its merits. The opening in the oval spout on the breast of the pail should be 3½ × 4½ inches, so that milk or water can be poured into other vessels quickly without so much risk of spilling on the floor as with the common pail.

The milk strainer should be 12 inches wide at the top, with a three inch perpendicular side, then sloping inward so that the strainer will be about 5 inches wide at the bottom and 8 inches deep The finest brass wire should be used—coarse wire is not suitable. The wire should be 3½ inches in diameter so as to strain the milk quickly. A small strainer causes some delay at milking time.

The milk should be ærated and cooled when it is intended for the cheese factory or creamery. Some ærators force the air into the milk, but with others the milk flows over the outside in a thin sheet or falls through the air in very fine streams. If the air is impure, ærating is of not much use to improve the flavor of the milk. I do not recommend farmers to purchase ærators, because milk can be cared for just as well by stirring frequently with a dipper or a stirring utensil like the one above. It is made of a piece of tin 4 inches in diameter, hollowed in the centre like a saucer and attached to a $\frac{3}{16}$ wire handle 24 to 28 inches long, and will cost about 20 cents.



Ærator to force air into the milk.

Milk Agitator.

Thermometer.

Skimmer.

Milk Cooler.

Cream Dipper.

If the milk is going to be sent to a cheese factory, it is much better to set the milk in water, stir often, and cool to 70° F. in less than one hour, immediately after milking, then remove it from the water. At this temperature the milk will keep, even in hot weather. It will mature sufficiently for the cheesemaker, and the thin coating of tough cream that usually rises on hot milk will not appear, besides there will be less waste of butterfat in the whey, and a better average sample of milk can be taken for testing purposes. If the weather is cool, the temperature of the milk should not be lowered below 75° F. If the milk is for the separator creamery cool and stir in the same way, but lower the temperature of the milk below 60° F. If the milk is for domestic use in the village, town, or city, use ice and cool to 42° and hold at this temperature until time for delivery.

Ærating or stirring and cooling should go together, but neither will overcome the evil effects of dirty handling and impure air. Milk that is held for two days at the farm should be cooled to a lower temperature than those already mentioned.

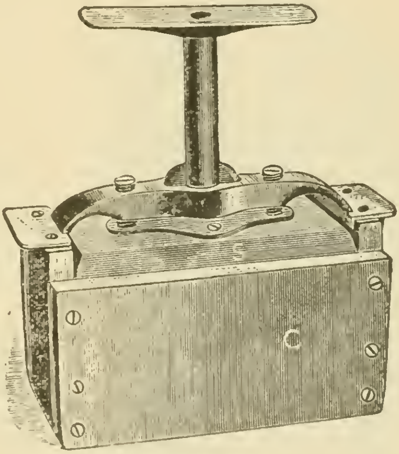
A glass floating thermometer that will test 170 degrees of heat is the most suitable for the dairy, as it will do for pasteurizing temperatures without any risk of breaking. The thermometer is easy to clean.

If the milk is set in water to raise the cream, the common Cooley or Shot Gun can, with a tap and glass at the bottom, is the most suitable. The skim-milk can be drawn off closer without wasting the cream, with the aid of the glass. It would be better if the bottom of those cans were put in so that the opposite side of the bottom from the tap would be about 4 inches higher. This would cause any sediment that may settle in the bottom of the milk to run out with the skim milk before the cream reaches the bottom of the can.

Good skimming can be done by a steady careful hand with the conical skimmer. Its size should be 5 inches in diameter at the top (without any wire around the edge) and 6 inches deep and it should have a flat handle 12 inches long.

The Cabinet Creamers are very nice and convenient to work about but they cost more and do not raise the cream any better than is done in a common box or barrel that will hold water. Better put the money into a cream separator than into a Cabinet Creamer.

Cream and Buttermilk Strainer.

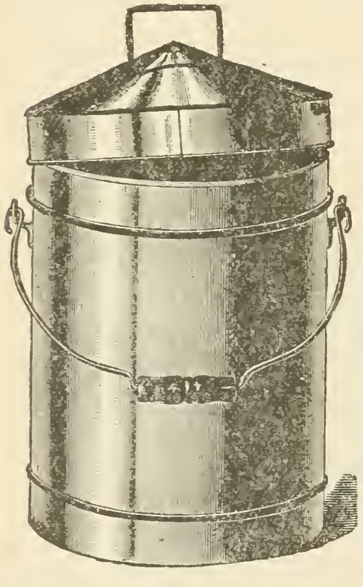


Butter Mould.

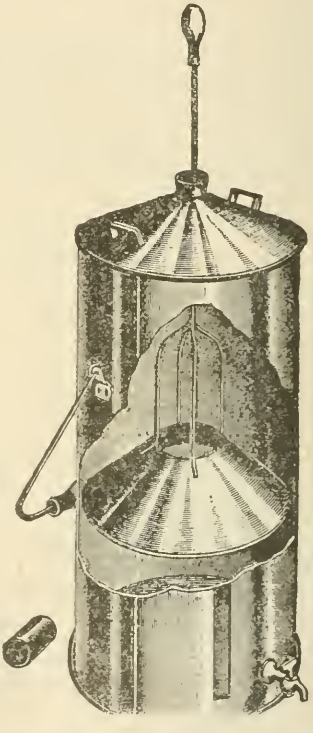
If the milk cans are submerged in the water the tank should be 22 inches deep, but if not, the tank should be but 18 inches deep. If the shallow setting system is adopted, 6-quart tin milk pans are the best as they are light to handle, easy to clean, and the milk cools quickly. Crocks or 6-quart pails are not at all suitable. The old perforated tin skimmer should not be used for skimming pan milk; better use a table knife to loosen the cream around the edge of the pan, then set the pan of milk to be skimmed on the edge of the cream vessel and run off the cream without breaking it up and mixing it with the skim milk. This mixing can hardly be avoided with the perforated skimmer.

Having tested over one hundred samples of skim milk that I got at farm dairies, and having found about an average of nine-tenths of one per cent. of butter fat, or equal to one-quarter of the butter fat in the milk as it came from the cows, lost in the skim milk, I have come to the conclusion that a cream separator is necessary in the average dairy with a herd of ten or more cows. I have tested many separators and have found that any of them will recover practically all of the fat if properly run; but some of them are too heavy to run and are not a good kind to buy, neither is a separater that will not skim 300 lbs. per hour, as too much time is wasted while skimming. There are separators that will skim 300 to 600 lbs. per hour, and are easy to run by hand. A cream separator is a very durable machine and easy to manage. The tread power is the cheapest power that farmers can provide to run a separator or churn, and is very suitable if it has a good governor. This is a power that is needed in the dairy business. One made at a low cost, so that a light animal could run a hand separator or churn, would be useful.

If steam power is used there will be a continual outlay for wood or coal, considerable time is required to attend to the fire and water in the boiler, and there is more danger from accidents by fire ; but there is one thing in its favor—that is, hot water and steam are always ready for cleaning up. But the tread power is ready at any time if an animal is at hand to put on it. After the first cost of the machine is paid there will be practically no further outlay.



Cream Can.



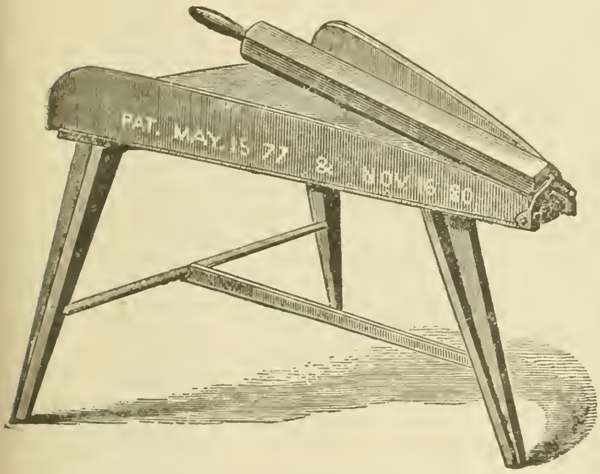
Cream Can, showing inside an excellent agitator for cream or milk.

A cream can twenty inches deep, eleven inches in diameter, with a handle on each side six inches from the top, and a close fitting cover, is the right size and shape for the average herd of cows, and will hold all the cream that should be churned in a No. 3 dairy churn at one time. In a dairy with fifteen to twenty-five cows, a common cheese factory milk can that will hold 160 lbs. or sixteen gallons, will give good satisfaction. This can, when full of cream, can be lifted in and out of the water tank and the temperature of the cream regulated for ripening or churning as desired. In larger dairies a vat made similar to a creamery cream vat may be suitable, but for practical everyday use it is not any better than the milk can, and its cost will be very much greater.

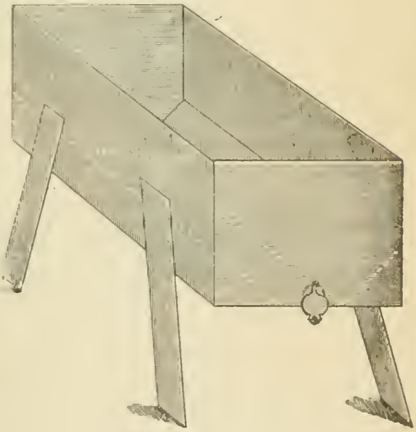
The cream and buttermilk strainer is one of the most useful utensils in the dairy. It should be nine and a half inches wide at the top and seven inches at the bottom, and six inches deep. The bottom should be made of perforated tin, with eight to twelve perforations to the inch. More or fewer perforations to the inch would make the strainer too fine or too coarse A good handle, ten inches long, with a piece of double tin on the opposite side, as shown in the illustration, will make it complete, so that it will sit on the mouth of the churn or in a large milk can without holding by hand.

In all the trials I have made of the different kinds of churns that have been sent to be tested, none have equalled the barrel churn when the same quantity of the same kind of cream, at the same temperature, was tried in each churn. The barrel churn was always churned in the same or less time, with less waste of cream. Besides, it is very durable and is easier to clean and work with than any other I have met with, except the box churn, which is practically the same in the way it works. The barrel or box churns should be filled only one-third full. Too many will fill these churns half full or over, leaving no room for concussion after the cream begins to swell. These churns should turn seventy times per minute.

The lever butterworker costs very little compared with other workers, is easy to make, and is well adapted for the farm dairy. None should be without it. It should be thirty-six inches long, thirty inches wide at one end, and four inches wide at the other end, with sides six inches high. The legs should be long enough to make the worker twenty-four inches high at the wide end, and twenty-one inches high at the narrow or lower end. The lever or roller should be made of two and a half or three inch hardwood scantling, with the four corners shaved off, so that the lever will be right-sided. The worker may be made of basswood, whitewood, or any kind of hardwood. I am using one made of basswood, which is all that could be desired.



Butter Worker.



Washing Sink.

The oblong butter mould, or printer, is the most popular printer in use, as it is a speedy and neat form in which to put up butter for market. The butter is in such a shape that it can be wrapped quickly as well as neatly with parchment paper, and will take less room in the shipping box than any other form of pound prints. Some are made all of wood while others have a nickel-plated iron top—the latter are more costly. The all-wood printers cost about fifty cents and do just as good work as the other. The handle should have a broad top and should not be too long ; brass screws should be used, as iron screws rust and spoil the appearance of the mould.

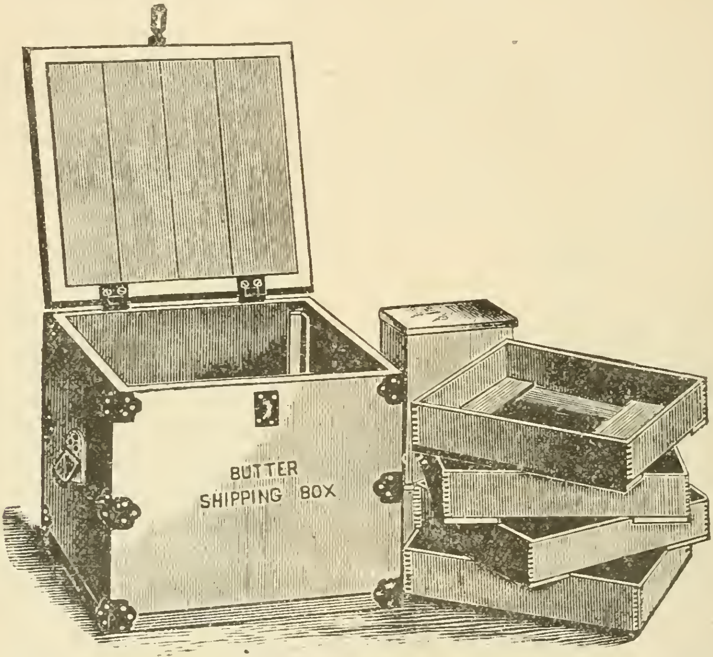
The butter spade, or ladle, should be six inches long and five inches wide, with a handle six inches long. It may be made of three-quarter inch maplewood.

The packers should be made of five-inch maple scantling, turned so as to have the handle about twenty-six inches long, and the bottom, or broad end, eight inches long. The square packer is for boxes and the round one is for tubs.

The common platform counter scales of 240 lbs. capacity is the most serviceable scale for the dairy.

A salt sieve is a necessity in every well equipped dairy. A two quart tin with a handle and a perforated tin bottom twelve inches in diameter—eight perforations to the inch—is a good sieve for salt. Hair sieves are not durable and are more costly. The cream strainer would do for this purpose, but it is generally wet just at the time it is needed for the salt, but it could be cleaned and dried.

The shipping box with the ice chamber in the centre, such as is used by creameries, is about as suitable as any shipping box that can be got. They are not very costly and are well suited for shipping print butter in warm weather. When the butter is to be packed, it should be put in boxes or tubs lined or coated with parrifine wax, also lined with parchment paper soaked in salt brine.



No dairy outfit is complete without a washing-sink. The cleaning of all the utensils can be done much easier and better when an appliance of this kind is in the dairy. Farmers would find a washing-sink valuable for many purposes in the home—one made as illustrated, thirty inches long, eighteen inches wide, ten inches deep at the perpendicular sides, then sloping down and in from the sides until the sink is fifteen inches deep in the centre and six inches wide at the bottom, with a gate tap at one end, and legs long enough to make the top of the sink 34 inches high, The outside should be made of inch lumber and the inside lined with galvanized iron or heavy tin. A smaller sink would do for a small dairy.

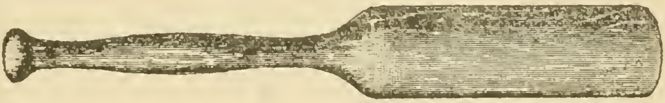
In large dairies a small boiler to heat water, make steam when required, and to cook feed, would be useful. It is necessary to have boiling water to clean milk utensils, and steam is valuable to clean places where it is difficult to clean in any other way, also to steam the churn, tubs, etc.

The rubber mop is used to dry the floor. The head is made of two pieces of hardwood four inches wide, eighteen inches long, and one-half inch thick, a piece of pure rubber three-eighths inches thick, or a piece of an old rubber belt, cut three inches wide and eighteen inches long, and fastened between the pieces of wood with wire nails without clinching. A handle about five feet long makes this a very useful tool in the dairy.

The hand brush is used for cleaning tin utensils, churn, butterworker, tub, etc.

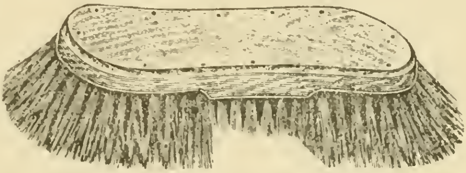
The dairy one gallon dipper is a dipper that should be in every kitchen as well as in every dairy. It is made large to save time handling quantities of water or milk. It should have a copper bottom to make it more durable.

Butter Packer.



Butter Worker.

Butter Mould.



Hand Brush.

Bottle Brush.

Mop.

To complete the dairy outfit a Babcock milk tester should be had to find the value of each cow's milk and the losses of butter fat there may be in the buttermilk or skim milk. No progressive dairyman or dairy community should be without this test. It is a valuable educator and has been the means of bringing about great reforms in the dairy world.

In conclusion would say that I have found by practical experience that the utensils and appliances I have described and recommended will prove to be a good selection to equip a small or large dairy.

PASTEURIZING MILK AND CREAM.

By W. J. Palmer, B. S. A., Toronto.

Pasteurization, so called, is the heating of milk or cream to a temperature of 160 degrees for 15 or 20 minutes, the object being, 1st., to remove bad flavors; 2nd., to destroy undesirable germs (bacteria) present in the milk or cream.

Sterilization, on the other hand, is the heating to 240 degrees, which destroys all becteria in the milk, but at the same time gives it a "cooked" flavor, and hence is not desirable except in cases where the milk or cream is intended for long keeping.

To make a fine-flavored quality of butter, it is absolutely necessary that the cream should be free from taint of any kind. During the winter, unless all the conditions are perfect, it is very difficult to get cream of the right flavor, especially when turnips or corn ensilage are fed or when the milk is set in a close room or cellar. In supplying the city trade with dairy butter, we find it difficult to get a steady supply of a really good quality, free from objectionable taints. If pasteurization were adopted by every buttermaker, however, we might expect to get dairy butter equal to the finest creamery, and which would bring not 17 to 20c. per pound., but 23 to 24c.

Regarding the second effect of pasteurization namely the destruction of undesirable germs, it might be well to discuss for a moment the number of germs which exists in milk under ordinary conditions. Milk in the udder of a healthy cow is "sterile," that is, contains no germs; the little milk that remains in the teat however between milkings afford a subtle breeding place for the germs which enter through the opening of the teat. Mr. Harrison, of Guelph, has found as many as 50,000 germs in a teaspoonful of foremilk (the first few streams) while a teaspoonful taken from the pail 15 minutes after milking contained as many as 10,000 germs. These germs of bacteria increase at an enormous rate, so much so that milk as delivered in cities will often contain as many as 1,000,000 in a teaspoonful. Luckily these germs are not all injurious, if so it would be absolutely necessary to sterilize all milk before using it for any purpose or the results would be disastrous. Some are beneficial and some injurious. The object of pasteurization is to destroy such disease-causing bacteria as are liable to be present, and so many of these that are instrumental in bringing about changes in the milk or cream, that it is then safe for the consumer, or keeps sufficiently long for most purposes. For the city trade it is doubtful if pasteurized milk could be made to pay, as the expense of treating and subsequent cooling would be considerable. As pasteurized cream is somewhat thinner than ordinary cream, it would hardly suit the city trade. For winter butter-making, however, it is certainly advisable to practise the system, and I would strongly advise every buttermaker to try it. It has already been adopted with success in several creameries and private dairies. I have yet to hear of a buttermaker who has tried it and pronounced it a failure.

How to Pasteurize. Any system by which the cream can be heated up to 160 degrees within a reasonable time and then cooled down to ripening temperature (70 degrees) will suit. A plan followed by some is to put the cream in an ordinary deep-setting can and set it in water at about 180 degrees; it is then well stirred until it reached 160 degrees, the can is then removed from the water and allowed to stand for 20 minutes, then placed in cold water and the cream cooled down to 70 degrees, when a starter of sour skim milk or buttermilk is added. Allow it to stand until the acid begins to develop quite strongly and thickening commences. The cream is then cooled to churning temperature, which varies from 50 to 58 degrees. To ensure good grain and body in the butter the cream should be cooled to churning temperature for at least three hours before churning, to allow the fat to harden.

In conclusion, if you are troubled with bitter, turnipy or bad tasting cream of any kind, try pasteurization and you will find that it will pay you in the end.

PROFITABLE DAIRYING.

By Jas. Stonehouse, Manager of St. Marys Creamery, St. Marys, Ont.

This subject is one of vital importance to the farming community of this country, and not only to the farming community but to every class of citizens, because the prosperity of our country as a whole depends very largely upon the prosperity of the farmers, and anything that tends to help them is an indirect benefit to the whole community. The growing of cereals as a source of direct profit seems to be a thing of the past, for the Province of Ontario at least, and the feeding of cattle has been unsatisfactory for some time past, and the farmers have been forced much against their will, to abandon their old methods of farming, and in many sections they have now adopted dairying as the most profitable source of money making. Our people as a rule do not take kindly to dairying, because it requires close and continuous attention for twelve months in the year, and it deprives the farmer to some extent of the liberty which he enjoyed under a regime of grain growing, and which only required his close attention during seed time and harvest. Dairying holds out but little inducment to the man who is in haste to become rich, but it does hold out inducements to the man who is content with a sure and steady income. But if that income is eaten up with the expense of producing it, it is no better than no income at all, and a good many of of our farmers are just in that position as far as their dairying business is concerned. To make dairying profitable there are several factors to be considered. but those to which I will direct my attention principally in this paper will be the "Cow," the cost of feeding her, and how that cost may be reduced. In order to have a profitable cow we must have one that will make butter or cheese enough in a year to pay the cost of her feed, the cost of caring for her, the cost of making and marketing her produce, and a liberal interest on the investment I wonder how many farmers in the Province of Ontario can say from actual calculation how much it costs to keep and care for a cow for one year. I will venture the assertion that there is not one in fifty, and perhaps I would be safe in saying not one in a hundred, yet it is very important point in determining whether we are carrying on our dairying operations at a profit or a loss. The breed of a cow has but little to do with it so long as she is well adapted to the particular purposes for which we are using her. There are good and bad dairy cows in all breeds, and if we have a profitable cow of any breed, or no particular breed at all, it would be folly to discard her simply because she is not of a popular dairy breed; but whatever the breed is, success depends more upon the herd than upon any one point. Much of course depends upon the feed and care, but the best feed and care will not make a cow that has a capacity for only 125 lbs. of butter per year a profitable cow. H B. Gurler, an American authority on dairying, and one who speaks from actual experience, claims that it costs $35 to feed a cow for a year, $12.50 for labor, and $2 50 for interest making a total of $50 per year against the cow which she has to pay back in milk. He allows $10 for skim milk and there is $40 to be paid for in butter, and that would require 200 lbs. at 20c before we have any profit. The same authority says that at the last census of the United States the average of butter for the 16,000,000 cows of the United States was only 130 lbs and if it takes 200 lbs. at 20c, or 266 lbs. at 15c to pay the cost of feed and labor the average American cow is run at a loss of from $15 to $20 per annum; and what is true of the American cow will hold good in the case of the average Canadian cow, although Mr. Gurler may be rather high in his estimate of the cost of a cow's feed. Prof. Dean, of the O. A. C., has also made a study of this subject, and he claims that it costs the Canadian farmer $25 for feed, $10 for labor and $2.50 for interest, making a total cost of $37.50, and if we allow $10 for skim milk we have $27 50 to be paid for in butter before we have any profit, and which would require 183 lbs at 15c and if the average cow gives only 130 lbs per annum we are losing $8 per head, and the more of such cows we keep the poorer we become.

Now this is no overdrawn picture, but is a conservative estimate of the cost of feeding and caring for a cow in Ontario, and if we would take the trouble to ascertain the facts of the case we will find that an average of 130 lbs. of butter per annum is a liberal estimate under the old order of things. In my experience I have found that a cow which gives six lbs. per week for three months, then five lbs. per week for three months, and four lbs. per week for the next three months, making a total of 195 lbs. for nine months and then goes dry, is far above the average and is one of the best of an ordinary herd. It has been difficult until quite recently for a farmer to determine accurately which were his profitable and which were his unprofitable cows, but the enterprising dairyman is no longer at sea on that point, for by the use of the Babcock test he can settle that point definitely, and no dairyman can carry on his business to the best advantage unless he does use the Babcock test, for it is the only reliable and practicable method of weeding out the unprofitable cows which we have at hand, and unless the non-paying cows are weeded out dairying can never be made profitable. It is no practical use for a farmer to take a sample of each cow's milk to the factory to be tested, and then pin the result of the test upon the wall to show his neighbor which cow tested the highest and which tested the lowest, and make no further use of it. A test of a single sample of cow's milk is of no earthly use in determining whether a cow is paying or not, for a cow's milk will vary from five-tenths to two per cent. between the night's and morning's milk, so that the only correct method is to take a sample of every milking for a week and then weigh the milk, then test and estimate the yield, and this should be done once a month and the testing should be done on the farm by the farmer's own tester, and not sent to the factory or creamery to be tested, for it is an imposition to ask the butter or cheese maker to test your milk. A four or eight bottle machine with half a gallon of acid and all complete can be bought now for about seven or eight dollars, and will do half a dozen farmers, and it is one of the best educators that a dairyman can possibly get if he will use it faithfully and intelligently; and if he has not the necessary knowledge to use it let him or some one of his family learn how to use it, and it will soon repay the cost many times over if he will heed what it reveals to him. The length of time a cow will give a good flow of milk is a very important factor in determining whether she is a profitable cow or not. Many cows, and I might say the majority of cows, have been trained to go dry at about nine months and usually the last month or six weeks is strippings, so that with most cows we can count on only seven months of a good flow of milk, which is a great mistake, for in many cases it was not the cow's fault in the first place, because she was let go dry at about nine months after her first calf, and that often fixes the time when they will go dry. With winter dairying coming into vogue we should have cows that will give a paying quantity of milk for at least ten months in the year. Some cows are much more persistent milkers than others, and it is well to keep that point in view in breeding.

Then the question of feeding is a very important one, but important as it is if we have not the right kind of a cow to feed, a discussion of it will be useless, for the more good feed we put into an unprofitable cow the poorer we become. While it is necessary to feed a cow good feed and plenty of it to make her do her best, we must at the same time feed as cheaply at possible, and it is a study in cow economy to know what to feed so as to produce the best results and to have it cheap enough to produce a profit, and if we grow our own feed the market value of that feed does not represent correctly what it is worth to each individual farmer, because a bushel of grain may be grown by one man for twenty-five cents while a bushel of the same grain may cost another farmer forty or forty-five cents to produce it, and while one man may be feeding that grain at a profit the other man may be feeding at a loss, while each is getting the same results from his cows. Good farming right here plays a very important part in the economical feeding of our stock. For illustration we will take two farmers living side by side, one grows enough on his 100 acres to feed ten cows besides his other stock, while his neighbor by better farming grows enough on his 100 acres to feed twenty cows and as much other stock as No. 1 has, and while No. 1 will be scratching along and barely making ends meet thinking the meanwhile that there is no money in dairying, No. 2 will be making money and apparently with no more effort than No. 1 was putting forth.

Our profits in dairying lie largely in cheapening the cost of the feed, and if we can make an acre produce as much cow feed as two acres did ten years ago, we have taken a long stride toward making dairying profitable, and I believe it is quite possible to do so, and I believe that many are actually doing it. The more cows we keep the more we grow on our land, and the more we grow the more cows we can keep, and it is difficult to tell just when the limit is reached, and it certainly has never been reached in Canada; for we know little or nothing of intensive farming as it is practised in some of the densely populated places of the earth, and if we knew and practiced a little more of it our farmers would be money in pocket. Take the Channel Islands, for instance, the home of the Jersey and Guernsey, and if a man has ten acres he has a good sized farm, and the amount of stuff that can be grown on ten acres where the land is pushed to its very utmost is simply astonishing.

Corn and the silo is unquestionably the solution of our food problem, and I believe that where a farmer grows from ten to fifteen acres on a 100 acre farm, and has silo capacity for that quantity, he can carry double the stock that he could under the old methods of farming, I believe the time will come in the near future when cows will be fed silage the year round by our most enterprising farmers, and in fact some are feeling it nine months in the year now, and they are the men who are making dairying pay, while others are looking on and wondering whether this silo business is what it is cracked up to be, and they can tell you of lots of cows they have heard of that have been killed with silage, and they hear that it makes poor butter, and they have heard that in some cities the authorities will not allow silage milk to be sold, and all such rot. Now this is not imaginary, for there is a certain class of farmers all over this country who talk just that way, and they will not leave the old ruts of farming until they are fairly crowded out. Now, I have yet to run accross the man who has lost a cow or anything else from eating good, well-cured silage, although such may be the case, but they are few and far between. I have made butter for the past three winters from silage milk, and I just as soon eat it as any grass butter I ever made. Just here I might say a few words about turnips A great many farmers in Ontario, and there are some not far from St. Marys, who firmly believe that there is no winter feed that will produce the flow of milk that a combination of turnips and other feed will; but I think I am safe in saying that any who entertain such ideas have never tried a ration of mangels, silage, clover hay and a quantity of meal or bran A liberal ration of the ingredients I have mentioned will produce a flow equal to the best grass, and will have none of the objectionable flavor of turnips. Cows fed on good silage will never hanker after grass in the spring, and they get such a relish for it that they will leave the best grass and rush to the stable for a feed of silage; and if we study cow language we must be forced to the conclusion that we have no other kind of coarse fodder which is so satisfying to a cow as good corn silage, and when it produces such excellent results we must admit that there is no class of fodder which will produce a pound of butter as cheaply as corn silage. Let me urge upon all who intend to go into winter dairying to prepare for a good supply of it during the summer of 1899, and those who have, not got silos should lose no time in securing one. They are now built so simply that a tub silo twelve feet in diameter and twenty-five feet high can be built for $60 to $70. I. J. Gould, of Uxbridge, Ont., has had this style of silo for four years, and he says that they are such a benefit that he could afford to build a new one every year. I believe the time is not far distant when the silo will play a very important part in summer feeding. I know of some farmers now who have a small silo aside from their winter silo which they fill for summer feed, and I know that if I was farming at the present time I should endeavor to have silage for summer feed, and keep the cows in during the day and let them run out during the night. By following that course I know that a cow can be kept for a year on a good deal less land than the average cow is now kept. For profitable winter dairying we have got to study the comfort of our cows more than we have done in the past. Most farmers think that it is necessary for cows to be turned out every day to get exercise, and will leave them out until they are thoroughly chilled, which is a great mistake, for you cannot chill a cow which is giving milk without seriously affecting her flow of milk.

Mr. Alex. Pottie, of Paisley, Scotland, in a lecture under the auspices of the Glasgow and West of Scotland Agricultural Discussion Society, on "How to make the most of the Cow in Winter" said that there was a great deal of misunderstanding as to what was the proper temperature that should be maintained in cow byres in winter. From experiments extending over a considerable period which he had made in byres he found that the temperature at which cows gave the largest amount of milk was sixty-three degrees. No artificial heat was necessary. Byres should be heated by means of the warmth of the cows in them. In a properly constructed byre the difference in value of milk obtained from thirty cows in a temperature of sixty-three degrees was about $15 more per week than when the temperature was fifty-two degrees. Farmers did not seem to be aware of the loss they were sustaining by keeping their cows in cold stables; but I might say that cold stables are becoming a thing of the past. As a rule our stables are warm enough, but most farmers are careless about letting their cows get chilled during the day time. It is necessary for most farmers to let their cows out for water, but they should be out a few at a time and taken in again as quickly as possible during cold weather. Those who have water in their stables find that they are well repaid for the expense of putting it in. Dirty cow stables and filthy looking cows are things which should not be tolerated where winter dairying is carried on, and yet how many stables do we find which are otherwise. It is not the cow's fault, but the way in which our cow stalls are constructed in most cases. I paid a visit the other day to the stables of our milkman, Mr. Meighan, to the west of the town, for the purpose of seeing his cow stalls of which I had heard during my travels through the country. I felt that I was well repaid for my visit, and I would urge every dairy farmer to go and see for himself and contrast the looks of the cows in Mr. Meighan's stables to those found in the ordinary cow barns. Most of Mr. Meighan's cows are as clean and sleek as if they were running in clover, and I understand that before he constructed his stalls on his present plan some of his cows were a sight to behold for filth. Any ordinary stall can be changed to Mr. Meighan's plan at a very small expense, as it is mostly in the way he has his feed boxes arranged, which leaves a space for the cow to go foward in to lie down, and she is compelled to step forward before lying down by a 2x4 scantling on edge in front of the cow's hind feet while standing.

The overhead part of most of our cow stables would stand a little improvement, for the vast majority of them are festooned from one end to the other with dust ladened cobwebs, which are allowed to accumulate year after year with never a thought of bringing them down. Now why should such filth be allowed to accumulate in our stables any more than in our houses? We want to take a few lessons in this respect from some of the dairying countries of Europe—some of these nations with which we expect to compete for a share of the butter trade in the markets of Great Britain. Prof. Dean told me that when he visited Holland on his tour of the dairying countries of Europe two years ago he and his wife went to visit a celebrated dairywoman and they were first ushered into the parlor, then the next room they passed through was the cow stable, then came the kitchen. It being summer time the cows were not housed, and the stable was cleaned and whitewashed the same as any room in the house, and it was adorned with bric-a-brac and flowers. Now we would think any man or woman was crazy to fit up a cow stable like that in this country, but those people know the benefit of it, for they have been dairying for centuries, and the pedigrees of some of their cattle go back over a thousand years, and they take a just pride in them.

Before closing I would like to say a few words on co-operative dairying, and the prospects which our butter has in the markets of Great Britain. The plan upon which the Danes have achieved such success in the markets of Great Britain has been one of co-operation, and co-operative dairying has been carried on to a greater extent there than in any other country in the world, and their butter has attained such a standard of excellence that it is held up as a standard for the rest of the world to imitate if possible. We have the climate, the soil and the cows to compete with them if we will only apply ourselves to the task. Our summer butter when made on the co-operative plan and by our best makers will compare very favorably with the best Danish butter, but there is a lot of inferior stuff turned out of our creameries through careless and dirty makers and careless patrons, but that state of affairs is fast being remedied by the influence of our dairy schools.

In our winter dairying we have a number of difficulties to contend against that we do not have in the summer, which make it very difficult to turn out a fine flavored butter, and the unscrupulous and the careless patrons are to blame for most of the troubles in winter butter-making. The eyes of the whole world seem to be turned to Great Britain as a place to dispose of any surplus eatables they may have on hand, and the rapacious maw of John Bull seems equal to the task of eating everything in sight, and it is to the people of Great Britain we have to look to to consume our surplus dairy products. It has looked as if our butter industry might easily be overdone, but when we remember that the population of Great Britain is increasing at the rate of 400,000 per annum and the yearly increase in population means an increase in the consumption of butter of 10,000 tons annually, we are not liable to overstock the British market with first-class butter for some time to come, for the yearly increase in the demand would require 200 creameries with an annual output of 100,000 pounds each, which is more than the yearly output of all the creameries of Canada combined.

WHAT THE DAIRY INDUSTRY HAS DONE FOR CANADA, HOW IT CAN BE IMPROVED, AND WHAT WE MUST DO TO MAINTAIN OUR REPUTATION IN THE BRITISH MARKET.

By A. F. McLaren, M. P., Stratford, Ont.

I may say that I have travelled during the past season from one end of this fair Dominion to the other, also very largely throughout the United States, and after all I have seen, heard and learned, I have returned to our own fair Province more than ever convinced that the eyes of the whole of America are riveted on Ontario (that is speaking from a dairy standpoint), and we here at home do not, and have not, realized what a Klondike the dairy business has been to us, and we do not for one moment realize what it is now and what it will be in the future ; but we must go on and advance our business if we want to stay in the race.

Since 1862, when the first cheese factory was opened in Canada, the manufacture of cheese has gone forward with leaps and bounds until to-day we supply England with sixty per cent. of the cheese which she imports, but there is still great room for increase in quantity and improvement in quality.

The value of our yearly cheese exports since 1866 is as follows :

1866	$ 123,494	1882	$ 5,500,869
1867	193,554	1883	6 451,870
1868	617,943	1884	7,251,989
1869	549,572	1885	8,265,240
1870	674,486	1886	6,754,626
1871	1,109,906	1887	7,108,978
1872	1,840,284	1888	8,928,242
1873	2,280.412	1889	8,915,684
1874	3 523,201	1890	9,372,212
1875	3,886,226	1891	9,508,800
1876	4,050,008	1892	11.652,412
1877	3,897,968	1893	13,407,470
1878	4,121 301	1894	15,488,191
1879	4,034,750	1895	14,253,002
1880	3,893,366	1896	13,956 571
1881	5,510,443	1897	14,676 239

Any reasonable man in this Province should feel pleased and gratified at the rapid progress we have made in the past thirty-five years. During all this time I have watched with interest and pride the rapid advancement of our great cheese industry. At sixteen years of age I was making cheese at Fullarton, which has one of our very best factories; after that time I made cheese in several other factories, and as you all know I have visited nearly all the factories throughout the Province of Ontario, in fact I might say throughout the whole of the Dominion of Canada; and I know whereof I speak when I say we have fought a great fight, and we have accomplished wonders, notwithstanding all the competition we had from the United States and other parts of the world. We have in the old country a reputation of which we should all feel proud, and a reputation, which we, as dairymen, as proprietors of factories, as cheese-makers, as cheese buyers, should all help to maintain. The markets for the last sixteen years have been very good, and this no doubt induced the farmers to go into the business, in many cases, throughout western Ontario, and I am safe in stating that we are surrounded with farms and farmers whose very salvation has been the cheese industry. I may also say that had they known in days gone by what they do now, their success would have been the greater, as to-day any intelligent farmer is doing with one acre of land and with one cow what he was doing in the sixties and seventies with two acres of land and two cows—aided as he is with the education received along the lines of dairying, feeding and breeding, cultivating of the soil, growing silo corn, etc. A man may now, with the aid of the Babcock tester, see what his cows are doing, weed out the poor ones, and keep none but those which pay him to do so. With our hogs and our pork factories, with the chances we have for using our whey, skimmed milk and buttermilk—with all these opportunities we are in a much better position than we were in the early days of this great cheese industry.

But how are we to go on and improve, and how, in spite of all opposition, we are going to maintain our position in the English markets? Let us quietly and calmly look into this matter. Suppose we are all level headed, thinking dairymen, it will not do to allow our heads to become swollen, thinking we know it all and have done everything that can be done, and saying to ourselves, "Oh! we are the people of Canada. We ship over sixty per cent. of the cheese which England consumes. We get sixteen or seventeen million dollars for our Canadian cheese. We are the people; we know it all." This will not do. What we want to do is go on and improve. That is the object of our Farmers' Institute meetings, of our annual cheese convention, our cheese inspectors, our Agricultural College, our monthly bulletins, which are sent out broadcast among the farmers, our Babcock milk testers, our first-class methods of making cheese, our first-class factories, our good cheese makers and everything complete. If we only apply ourselves we should have no trouble in making money out of the cow.

You may imagine how discouraging it is to one placed as I am at the head of the Butter and Cheese Association of Western Ontario, to have so much fault found with our goods. Almost every English mail brings complaints from some of the dealers in England to some of the dealers here, about the flavor of our cheese, the finish, the mouldy appearance, the bad curing, the hardness, the softness and the discoloration of some of our cheese. Many complaints are made which we should not allow the cheese consumers in England a chance to make, and which they would not make if we did our duty. All of the above complaints and many others are often heard; all of them can be overcome if every one in connection with the cheese industry would do his or her duty. There is no reason why the farmer should not take every possible care of the milk, knowing that the cheese and butter business is one of the most profitable branches of agriculture. There is no reason why he cannot test or have tested the milk of each cow. He should go all through his herd in this way and weed out every cow which is not making him a profit. With the use of the Babcock tester and a pair of scales, this very important information can be gained.

When a farmer has a herd of cows, all of which he knows to be good, it is in his hands to feed them the proper kind of food; he can supply them with plenty of water, give them all the salt they require and good pure food which will not taint the milk. He can keep them in comfortable stables, milk into tin pails, and see that the hands of the milkers are thoroughly clean. He can also strain the milk into the big milk can ; he can air and cool the milk and keep it in a very pure atmosphere. He need not leave it in the barn-yard over night, inhaling all bad odors, nor leave it standing in the morning sun. All these small details should be attended to, and the milk supplied to the cheesemakers in the very best possible condition. Attend to these little matters yourself, and see that your neighbors do the same. At the present time it is not being done, and I would advise all who have not given the matter much thought or consideration to see to it now that all the cows they have are good ones. With all the knowledge and skill you possess you should do better. You are all intelligent people, think what you are doing, think what milk, cheese and butter are doing for you, through this section. You can do better by that grand old cow in the future than you have done in the past ; think what a good friend that old cow has been to you. As soon as you begin to think seriously of that grand old cow, as soon as you begin to realize that she has been the foster-mother to so many of us, then you will realize, probably for the first time in your life, what a grand animal that old cow is ; and if you but treat her well and give her a fair show she will make money for all of us and make comfortable homes for us all. Get the right kind of cow, treat her well ; you push the button and she will do the rest.

Now I have told some of the things you could do. Now I want to tell you of how we can still go on and improve, and I shall only suggest a few ways. In the first place, I think every dairy farmer should go and see more of how his neighbors do their business ; he should go still farther and see for himself the best dairy farms in America ; he should see the best herds for dairy purposes ; he should see the best buildings, the best stables and barns; and, as I told you before, he should have a Babcock tester and a pair of scales so that he can weigh the food consumed and the milk produced, thereby ascertaining the cost of production and knowing exactly "where he is at" My idea is that the cow should be used and treated almost as well as if she were one of the family ; she should have every comfort, a good warm stable, lots of fresh air, and lots of sunshine. The stable for the cow is very much neglected, and is one place where we can improve very largely all over this Canada of ours. This is one point we could gain. Get better ventilation, more light, more sunshine and more pure air. Talking of more sunshine reminds me of a story I heard :

A minister one day while preaching a sermon was talking about the lack of sunshine among the Christian people of his congregation. He said they wanted more sunshine to shine in upon their souls. He said he was reminded of a story of a farmer friend of his who had for many years kept confined in a chicken coop an old eagle, a great favorite of his, a bird which he prized very much. By-and-by the old gentleman decided to leave that part of the country and to go away to some far off land, and he decided to give the eagle to one of his neighbors. Accordingly he went to his neighbor and told him he was about to leave for this far off land, and that he had this old eagle, and he wanted to sell it to him. He said he would not buy it he had no use for it. He stated, however, that he thought he knew a gentleman he could give it to. He went to the other man, and he refused to accept the eagle as a present, so he came home and he went to the hen coop, took the eagle out into the yard and let him go a free bird. The poor eagle wandered round the yard hour after hour. The man watched him and tried to get him to fly away and said, "Shoo, shoo, shoo," but the poor old eagle refused to be comforted and would not fly away. Finally the man became tired and went into the house to read his newspaper. After some time had elapsed he looked out of the window and found that the old eagle had landed on the top of the fence. The morning sun was shining brightly and it shown upon this poor old bird, and he seemed to be enjoying it, when all at once he stretched forth his right wing, slowly extending it as far as he could, then slowly bringing it back he remained still for a few minutes, and then he went through the same performance with his left wing, but remained still for a few moments longer apparently enjoying the sunshine. Then he stretched forth his neck as far as he could stretch it, and then remained motionless for another few moments, when all at once he stretched forth both his neck and wings and he soared away out of sight.

I use this illustration to show what sunshine can do. Give more sunshine, more air, more light in your stables and more sunshine for your cows, and they will give you better and purer milk, butter and cheese, and more money for your work.

As I said before go and see for yourselves the best barns in America: see the stables, see the barns, see the cows; then you will realize where improvement can be made, if any. I may say that I have gone into stables where the cows were breathing impure air enough to kill them. I have even gone into stables where it was so dark you could scarcely find the cows. I have often found them dirty and filthy enough to kill the poor animals. On the other hand I have found stables clean, neat and tidy, lots of pure water, pure air, lots of sunshine, everything in its place. What we want are all the barns and stables good, and when we accomplish this people will stop wondering why it does not pay them better to keep cows—why they have bad flavored goods which they cannot sell. I would also advise you to visit your cheese factory. You have a right to do so, you hold stock in it. You are a manufacturer and you help to pay the cheese-maker Visit it often, see how the cheese-maker is conducting himself, see that everything is neat, clean and tidy. First examine his engine and boiler room as you go in; see that his wood is piled up properly, that engine and boiler are shining; then examine his milk stands, weighing cans, scales, conductors, strainers, vats, curd sinks, floor, gutters, presses, curd-strainers, knives, and see that everything in the making room is as clean and neat as it would be at home. Then go into the curing room and see that all the cheese are the same size, no mould on them, no rust or cracks on the sides of them, no wrinkles in bandages, no lob-sided cheese, no mice eaten cheese, the shelves all clean and shining, no pile of boxes in one corner, boxes of salt in another, broken cheese boxes in another, old stove pipes rusting in another. Every stock holder should see every one of these things himself, and if not found perfect in every particular he should make a complaint to the Board of Directors and find out the reason why the milk was not being made up in the best possible manner. If every patron of the cheese factory will do this, then I will show you good cheese and butter and good prices; but I am sorry to say that I can point out hundreds of farmers who are sending milk to the cheese factories which they are seldom or ever in, and know nothing of how the work is being done.

To cheese manufacturers, to cheese buyers, to cheese sellers, I say: Go on in earnest, do your work well and you will find the butter and cheese business is our Klondike. If you want to win you must keep on going, and you must not forget that the eyes of the world are upon us. The United States are after us for a place for both butter and cheese in our English markets. In our own Dominion, they are working day and night to get a similar place to that which we now occupy. I know whereof I speak when I tell you about the various Provinces in our own Dominion as I have been in them all during the past few months. While in Manitoba, at an exhibition held in Winnipeg, judging cheese, I found that they were making strides in cheese-making and doing an extraordinarily good butter business, better I have never seen, and they are making lots of it.

While down in Quebec a few days ago, at Nicolet, I addressed a meeting where there were about four hundred, all engaged in the dairy business; the only English speaking people at the meeting were about twenty-five priests and the bishop of that diocese. These priests all take a great interest in the working of the dairy business, and preach the gospel of good oow, good milk, good butter and good cheese. It would surprise you to listen to the very intelligent manner in which these people talk about the dairy business. They are after the butter and cheese business, and all I can say to you is to be up and doing, if you want to maintain the place which Ontario now holds in the markets of the world. Then again Prince Edward Island is making rapid strides in the line of butter, cheese and hogs. Nova Scotia and New Brunswick are improving rapidly, and it simply means one thing, that we have to be up and doing, or some other portion of this fair Dominion, the United States or New Zealand will pass us in the race. With regard to the Province of Quebec, I may say that the hearts and souls of those French people are in the dairy business—that they are going ahead with leaps and bounds; and we must go right along giving more attention to food and flavor, the kind of cows we keep, the kind of milk we supply, the manner in which we produce our cheese and butter, or in a very short time Quebec will be ahead of us.

Before closing I would like to make a few suggestions for those who are engaged in the dairy business:

Don't allow your milch cows to eat turnips.

Don't allow your milch cows to drink impure water.

Don't allow your milch cows to go without salt.

Don't allow your milch cows to eat apples or refuse from the cider mill.

Don't allow your milch cows to eat rape or rye.

Don't allow your milch cows to be abused, whipped, run by dogs, or excited.

Don't allow your milkers to milk with dirty hands.

Don't milk in a dirty or filthy stable.

Don't leave your milk standing in the stable or barn-yard.

Don't allow your milk to stand in an impure atmosphere.

Don't milk into wooden pails.

Don't allow your milk to stand in the hot sun.

Don't mix hot and cold milk together if you can avoid it.

Don't allow your cans of pure milk to be placed on a dirty, filthy waggon.

Don't allow whey to be taken home in your milk cans.

Don't have a pig pen under your milk stand.

Don't draw cheese to the railway station in a dirty, filthy waggon—one which has been hauling manure the day before.

Don't allow your cheese-makers to buy second hand supplies.

Don't pay him such poor prices that he is obliged to use inferior goods.

Don't allow him to buy poor salt, poor rennet, poor bandage cloth, poor color, or anything poor, get him the best supplies and make the very best cheese.

Don't allow him to keep a dirty, filthy, slimy cheese factory.

Don't allow him to go around with dirty clothes, dirty pants, and dirty aprons, which will stand alone.

Don't allow him to neglect curing his cheese. See that he keeps the fire on in the curing room in spring and fall, and at the proper temperature.

If you pay attention to all the above "Don'ts" you will be sure to win, but every man, woman and child should be interested in the good work and preach the gospel of good milk, butter and cheese. If there is one careless farmer in all the patrons who supply milk to the cheese factory, he will spoil all the good work, as one bad can of milk will spoil the whole, and all the patrons will be sufferers. Keep on doing it well and I will be responsible for the statement that you will all go on and win and prosper.

HOME BUTTER-MAKING.

By J. J. Ferguson, B.S.A., Smith's Falls, Ont.

In this, as in all other matters, to deal with our subject intelligently, we must begin at the beginning: in this case, this means the milk. It should go without mention that if a first-class article is to be turned out, the raw material should be free from undesirable taste or flavor. Do not feed your cows taint-producing foods such as turnips, rape, green rye, decaying potatoes, or any vegetable matter in process of decay; should you do so, your butter will show it in a more or less pronounced flavor. It is always difficult, even with the best of care and proper foods, to secure right flavor in butter: do not make it *certainly impossible* to secure, by feeding those foods which you know will destroy it. Just here I would refer to the necessity of having a supply of salt easily and constantly accessible to the milking cows. Countless "hard churnings" are directly due to a lack of this. Salt is cheap, but it is a potent factor in keeping right the temper of the person who does the churning.

While I am quite willing to acknowledge that much good butter has been made by farmers and their wives with old-time appliances, still I know that much of the labor and worry of the business might have been overcome by the use of up-to-date appliances. Dairying, especially butter-making, under the best conditions, requires a large amount of work; without a proper working outfit it becomes the most positive drudgery. If the business be on a small scale, a large expenditure might not be justifiable, but where two or more cows comprise the herd, it will certainly pay to go to a considerable expense in getting things right to do the work. As a general thing, machine work is cheaper and better than that done by armstrong power.

At present there are three methods in general use for creaming milk, viz., the shallow pan, the deep pail or shot gun can, and the centrifugal separator. I have placed them in the order of merit. Shallow pans require large space and a pure surrounding atmosphere. One of the greatest objections to them is the labor involved in washing up the large number required where any considerable quantity of milk is to be handled. Deep pails require a supply of ice, or a large supply of water which can be kept at or about 45 degrees. Failing these, there is a great loss of butter-fat during the warm summer months. Generally, better results will be obtained late in the season, when cows have been in lactation for a long period, by the use of shallow pans in preference to the deep pails. At Guelph, the average loss of butter-fat for a season by the two methods was:—

Shallow pans,	.313 per cent.
Deep pails,	.29 "

This places the two systems practically equal, but remember this was under the very best conditions. Under average conditions, in farmers' dairies, the losses would be and are much greater, amounting in many cases from 20-40 per cent of the total fat in the whole milk. Such work does not mean "Dairying for profit," yet the trusty Babcock shows these results in many cases. I am firmly convinced of the efficacy of the separators in the home dairy The milk of newly-calved cows, or of those long milking, is handled with equal thoroughness of separation. You get the maximum yield of butter by its use; and what is of great importance, the skim milk is sweet, and warm with its animal heat, in the very best possible condition for feeding to calves or young pigs. True, the skim milk is "blue as summer sky" and the calves do not get much butter-fat, but ground oats or oil-meal to take its place are not as expensive as butter-fat at 20c per pound. With our separator we lose about one pound of butter in half a ton of skim milk; we think we can conscientiously let the calves have this amount. With good machines, properly run, the loss varies from 1-.2 of one per cent: this is trifling. Any of the separators on the market will give satisfaction if properly handled. Do not make the mistake of buying a very small machine because it is cheap. Do not buy a hand machine if you have ten or more cows: tread-powers are very good motive powers for machines of 600 or more pounds capacity. Personally, I like steam turbine machines, as I find them very easy to operate, easily kept in order, and reasonably cheap in price.

Having obtained the cream, great care is necessary to ripen it properly. It is well to have two cream cans of five to ten gallons capacity, with proper lids: by this means sweet cream may be kept separate from that which is ripened for churning. About 60 degrees will be found right for ripening temperature. Keep the cream well stirred so that ripening may proceed evenly; no fresh cream should be added to that in the can for twelve to twenty-four hours before churning, according to the season.

Churning. Many questions are asked as to the best kind of churn to use. The different styles are legion to-day, but of all I prefer the good ordinary barrel churn, and especially those of the "Daisy type." Patent gas vents are not desirable, neither are churns with internal fixtures, paddles, breakers, etc. It is always difficult to keep any churn perfectly sweet: thorough scalding and steaming, with frequent brushing with a stiff brush and salt paste, will aid materially in this direction. Immediately before using your churn, rinse out, first with hot water, followed by cold. Cream should always be strained into the churn through one or two thicknesses of cheese or strainer cloth; this removes any coagulated casein present, and is largely preventive of smallpox butter.

Churning Temperature. Should vary with the season and individuality of the different herds. As a general rule, the lower the temperature, consistent with a reasonable time in churning, the better will be the grain and color of the butter, and the more complete will be the churning. We find 58-60 degrees in summer and 63-65 degrees in winter give us good results. With some herds these rather high temperatures would result in impaired quality of product. Our churnings usually take thirty to forty minutes. I do not care for the five minute processes boomed by some agents.

Washing the Butter. If it is for quick consumption one washing is sufficient; if it is to be stored or kept for a longer time, it is well to wash until the wash water comes off clear. Much washing is sure death to the best flavors desirable in butter.

Salting. The amount of salt used depends upon the taste of your customer and market requirements. We supply one family with butter every week, which is not salted at all. For ordinary local trade ¾-1 oz. to the pound is about right. If customers demand it, I am willing to salt eight oz. to the pound. I prefer salting on the worker, then working only sufficiently to incorporate salt and butter. After weighing the necessary amount of salt, sift it over the butter through a fine wire or hair seive. This prevents hairs, pieces of crust, etc. getting into the butter, allows a more thorough mixing, thus preventing the appearance of small white specks.

Package. I care not how good the quality of butter if it be put up in a slovenly, careless way it will not please the eye, and what naturally follows touches the pocket of the consumer. Appearances count for a great deal in this butter business. For local trade there is nothing better than oblong pound prints put up in parchment paper. Oiled or waxed paper is an abomination for this purpose. When you are sure of being able to turn out a first-class article have a nice stamp printed on your wrappers. If your butter is not A. 1. never mind that stamp. So soon as customers know that a certain brand means quality every time, the demand for it becomes greater than the supply, and that at top prices. We buy our papers printed to order at $1.50 per M. They are as below,—

ONE POUND
SEPARATOR
CREAMERY BUTTER
FROM FERGUSON'S
Maplehurst Creamery,
SMITH'S FALLS.

For shipment to cities or towns, 30 pound tubs or 56 pound square boxes, both parchment lined, are very convenient. Whatever form of package is used always aim to have it neat, clean, and attractive.

In conclusion I would say I am not in any sense attempting to boom the private dairy in opposition to the large public creamery; for I believe that where such is within reach, it will in many cases be more profitable to the farmer to have his milk handled there, especially if help is scarce on the farm or if he be not easily accessible to a good market.

But thousands of farmers are, and will be for some time to come, not within reach of either creameries or cheese factories. For many of these there would be profit in this home dairy business if undertaken in a business-like way. But it is a line of work in which, if success is to be attained, a large expenditure of time, care, and labor are necessary. From the milking of the cows to the marketing of the finished product the constant watchword should be cleanliness.

HOME DAIRIES.

By Thomas Scott, Glenmorris, Ont.

In starting a home dairy the first thing is to get a few good cows of some recognized dairy breed. It is simply a waste of energy to keep any of the beef breeds of cattle in a dairy. When the proprietor of a small dairy cannot give his own personal supervision to his cattle, it is sometimes difficult to get competent help at a price commensurate with the money returns, as a small number of cows require the same attention as a greater number; but no success need be expected during the winter months when the cows are made a secondary consideration—perhaps fed and milked at six o'clock in the morning and not seen again until the afternoon.

It would be profitless to occupy your time advising what to feed. You nearly all take agricultural or dairy papers, many receiving Government reports, giving excellent information gained by careful experiments in the profitable feeding of dairy cows. Furthermore, we have to be governed largely by the circumstances in which we are placed, the price of feed at different times, etc. I buy all my feed except pasture, roots and fodder corn. I will tell you briefly what we feed, how we feed, and when we feed, and will give the results for 1897 (which is a fair average for the last ten years). We had ten cows of various ages, from twenty-two months to twelve years old, coming in fresh at intervals during the season. From the time winter feeding began we fed about as follows: Each morning and evening we mixed for the ten cows four bushels of newly cut, well eared, and well cured corn stalks, two bushels oat hulls (for want of chaff), one bushel bran, and ten pounds of meal (one half oats and the other half peas) and a little salt. The whole was moistened with six gallons of water and thoroughly mixed. It was then allowed to stand twenty-four hours. At six o'clock a.m one box full was divided among the ten cows, in proportion to size and appetite. The cows were then milked. At 9.30 we fed each a peck of sliced carrots; at 11 o'clock a feed of nice timothy hay; at noon, in good weather, they were turned out to water; on stormy days water was placed before them. At 3 o'clock each got a peck of sliced mangels. At 5 o'clock a feed of cut corn, etc. At 6 o'clock we milked, and at 7.30 gave as much hay as they would eat up clean, and bedded down for the night. All summer they had good pasture, plenty of water, and a little meal and bran morning and evening. We always milked exactly at six o'clock in the morning and six o'clock in the evening. The cost and the returns were as follows:

Cows Dr.

Ice	$ 5 00	
2 loads of straw for bedding	4 00	
8 tons of hay at $6.00	48 00	
900 bushels roots at 5c	45 00	
1 acre of fodder corn	20 00	
4 tons meal at $15.00	60 00	
3 tons bran at $8.00	24 00	
Pasrure ten cows, six months at 75c. a month	45 00	
Barrel of salt at $1.00	1 00	
Total		$252 00

Cows Cr.

January, milk, cream and butter	$45 00	
February, " "	47 00	
March, " "	48 00	
April, " "	49 00	
May, " "	56 00	
June, " "	63 00	
July, " "	55 00	
August, " "	54 00	
September, " "	51 00	
October, " "	52 00	
November, " "	55 00	
December, " "	57 00	
Total		622 00
Balance to credit		$380 00

The product was marketed as follows :

744 lbs butter to private parties, average price 18c.	$133 92
315 gallons cream at 70c. per gallon	220 50
1,327½ gallons milk at 20c. per gallon	265 50
	$619 92

The milk and cream were sold to two customers in bulk. I have not charged the cows any interest for the whole plant, nor have I credited them for the calves we raised on skim milk, allowing that the one would about balance the other, which left about $380.00 for the labor attending the cows. Making the butter, we use deep creamers with plenty of ice, winter and summer. Then follow as closely as we can the method advised and taught by the "Travelling Dairy," which is almost identical with a handbook published by Mrs. E. M. Jones, Brockville, which, by the way, should be in every household in Ontario where dairying is conducted on a small scale.

In conclusion, there is one thought I would like to emphasize. It is this : It is not enough to know *how* to do anything well ; the keynote is to *do* it.

DAIRYING AS A FACTOR IN THE ADVANCEMENT OF SOIL FERTILITY.

By C. M. Macfie, Appin, Ont.

If we follow the history of dairying in Ontario, we will find that in the districts where it has been most extensively carried on the soil is most fertile. The county of Oxford is a striking instance. Another example which well illustrates this point is in the township of Metcalfe, in the county of Middlesex. One part of this township is a clay soil, originally very fertile, apparently almost inexhaustible; another part of the township is a light sandy soil, in its virgin state, very easily exhausted. The heavier portion, through continued cropping, is now a hard clay, which in our uncertain seasons often fails to produce a crop ; while the lighter soil which would not yield a livehood if the same methods were adopted as on the other portion, and where dairying is quite extensively carried on, is in a splendid state of fertility. I hope I may not be considered egotistical if I say the farm on which I was raised, has through dairying operations, been changed from one of the poorest in the township to one of the most fertile. The fact stands, therefore, that dairying is a very important factor in the increase of the fertility of the soil.

It may be asked, then, how is this result produced? In the following table 2,000 pounds of each of the ordinarily marketed products of the farm are taken for comparison. The first three columns of figures represent, according to an analysis of one of our experimental farms, the quantities of nitrogen, phosphoric acid and potash contained in 2,000 lbs. of each product, and valuing nitrogen at 17 cents a pound, phosphoric at 7 cents and potash at 5½ cents. Column No. 4 contains the value of the fertility sold of the farm in the stated quantity of each product. Column No. 5 shows the market value of products at present prices, while the gain or loss is placed in the last column.

FERTILITY ELEMENTS IN FARM PRODUCE.

2,000 lbs.	N.	P.	K.	Value of fertility.	Value of Products.	Gain or loss.
	lbs.	lbs.	lbs.	$ c.	$ c.	$ c.
Wheat	41.6	15.6	10.4	8 75	26 67	17 94
Barley	32.	15.4	9.	7 02	12 50	5 48
Oats	38.4	12.4	8.8	7 11	14 70	7 59
Pease	70.6	17.2	19.6	12 87	20 00	7 13
Corn	32.	11.8	7.4	6 03	14 00	7 97
Hay	31.	8.2	26.4	6 68	6 00	—68
Clover	39.4	11.2	36.8	8 72	5 00	—3 72
Potatoes	6.8	3.2	11.4	1 87	16 66	14 79
Fat cattle	50.	31.2	2.8	9 84	90 00	80 16
Fat sheep	44.	22.6	2.8	8 34	95 00	86 66
Fat hogs	34.8	14.6	2.	6 35	92 00	85 65
Cheese	90.	23.	5.	15 39	160 00	144 61
Milk	10.2	3.4	3.	1 94	20 00	18 06
Butter	.5	....	....	08	300 00	299 92

It will be seen from this table that five tons of hay worth $30 sells more fertility from the farm than two tons of cheese worth $320.00; that one ton of butter is worth more than 20 tons of oats and contains only 1/140 of the fertility contained in the oats. One ton of milk sells one-tenth of its value in fertility, while one ton of pease worth the same, sells five-eighths of its value in fertility.

Then in connection with dairying the by-products are an important factor, as the utilization of these are becoming a more and more important factor in every line of manufacturing. The skim milk and buttermilk from one ton of butter has, at 20 cents per hundred, a feeding value of hogs of about $80, if fed in conjunction with meal. The whey from the manufacture of one ton of cheese has a feeding value of about $18 when sweet; when sour, a little less. It must be remembered too, that of the organic matter in foods there are certain quantities of constituents which are indigestible and these assist in giving manurial value to the foods fed. The foods of the successful dairyman are usually corn ensilage, clover hay, oat straw, oat and pea meal and bran, and sometimes oil cake. According to an analysis by one of the American experiment stations these have a manurial value as follows:

Corn ensilage	$ 3 00	per ton.
Clover hay	10 00	"
Oat straw and chaff	2 00	"
Oat meal	10 00	"
Pea meal	12 00	"
Bran	13 00	"
Oil cake	24 00	"

We will suppose a man feeds ten cows for six months of the year a daily ration consisting of six lbs. clover hay, 40 lbs. ensilage, six lbs. oat straw, two lbs. oat meal, two lbs. pea meal, five lbs. bran. During the six months he would feed :

5 2 5	tons clover hay, adding fertility to the value of....	$ 54 00
36	tons ensilage, " " " "	108 00
5 2-5	tons oat straw " " " "	10 80
1 4-5	tons oats, " " " "	18 00
1 4 5	tons pease, " " " "	21 60
4 1-2	tons bran. " " " "	58 50
	Total fertility value added to soil (if manure is applied without loss)....................	$270 90

If one ton of oil cake were added to the above quantity it would improve the value of the food ration and add to the fertility of the soil still further.

Dairying also assists in the increase of the fertility of the soil in enabling the farmer to utilize all the crops grown on the farm. The crop of a good one hundred acre farm in western Ontario, besides the wheat crop, which we will allow the farmer to sell at present market prices or exchange for mill-feeds, would be about as follows :

Hay—15 acres	30 tons.
Oats—15 acres	600 bushels.
Barley—7 1-2 acres..............................	225 bushels.
Corn—10 acres..................................	400 bushels.
Peas—7 1-2 acres...............................	150 bushels.

Suppose he sells one-half his hay crop and all his grain, the owner receives for all about $520 at present market prices. The value of the fertility in that part of the crop sold is about $335. The manurial value of the fodder fed after selling the produce is about $300, while the manurial value of all his crop if fed on the farm would be about $650. There is no question that if he had fed all his crop produced on the farm to cows or other producing stock he would have secured the value obtained by direct sale and added to the fertility of his farm by $350.

Then the dairyman by the crops he grows, to a large degree tends to improve soil fertility. The man who seeks a market for his hay crop must grow timothy to suit the needs of that market, and timothy adds nothing in value to the soil. If coarse grains are sold and cleaning crops do not take a necessary place in the crop rotation, that farm is soon over-run with weeds which utilize as much fertility as the grain crop, and all to no purpose. On the other hand, the good dairyman produces clover hay which not only increases the nitrogen supply in the soil but by its depth of root feeds largely in the subsoil. His main crop is corn, which while it draws quite plentifully on plant food tends to conserve soil fertility in being a cleaning crop. Large quantities of concentrated food, especially bran and oil-cake, are purchased, and these add to the soil's fertility in proportion as they are fed.

The good dairyman, too, is always interested in producing the best article possible. He takes the best care of his milk, and is interested in its manufacture into cheese and butter of the best quality, so that his produce always finds a ready sale. In this way he encourages himself to give close attention to business and to bring his farm to that state of virgin fertility in which it ought to be.

CARE OF MILK BY PATRONS.

By J. H. Scott, Harrietsville, Ont.

I think there is no more important subject than the care of milk from the time it leaves the cow until it reaches the factory. It is a subject that you may say is worn threadbare. It has been discussed and lectured upon at nearly all the dairy conventions and farmers' meetings held in the Province in late years, and still I believe there is no part or work in connection with the dairy business that is so much neglected. In meeting with cheese-makers throughout this section of the country they have all the same story, that they are troubled with gassy curds caused by tainted or "off flavor" milk. And why should this be? We find individual patrons of factories all over the country who never have a can of tainted milk from one end of the year to the other, and the question comes up before my mind, what is the reason that one patron can supply nice, sweet, clean flavored milk and his neighbor on the next farm, perhaps, has gassy milk two or three time a week? It should not be necessary to tell any intelligent patron of a factory that it is his evident duty to take the very best possible care of his milk, not from a personal standpoint alone. If he were the only person interested it would be no other person's business, but by taking a can of gassy milk into the factory it contaminates the whole vat into which it is put, no matter how perfect the flavor may have been. Of course you will say that the maker should reject all such milk, and just there is where the great trouble arises. Who should be the judge? The patron or the maker? For instance, a patron takes a can of gassy milk to the factory. The maker rejects it and refuses to take it in. What is the result? The patron becomes furious at once, and declares by everything great and small that he (the maker) has often taken in milk that was just as bad, or even worse, and that if he did not take in this he would go to another factory. Now, is this doing the maker justice? Or is it doing his neighbor who sends in perfect milk justice? Or is it doing himself justice by trying to put in an inferior quality of milk and expecting to receive the highest market price for a perfect and finished product? When a buyer comes around to inspect dairy goods of any kind, he does not ask the maker or salesman if the goods are all first-class and then pay the highest market price without first satisfying himself of the quality; but if he finds any that are not up to his standard of perfection he offers a reduction in price equivalent to the inferior quality of the goods.

.In view of this fact, then, should not the patrons of factories wake up to the sensibility that they must, in order to keep in the front ranks of the dairy business and compete with all the great cheese and butter countries who unload their products on the seaboard of Great Britain, produce good, clean, sweet-flavored milk. How is this to be done? The first great principle in dairying is cleanliness, and the greatest enemy we have to contend with in the handling and manufacturing of milk or dairy products, is dirt. Before going any further, I would like to impress upon the minds of patrons the difference between sour and gassy or tainted milk. A great many people seem to have got it into their heads that if milk is sweet that is all that is required, but it is an idea that they cannot get rid of too quickly. For my own part, for either cheese or butter, I would rather have 300 pounds of sour milk (not thick), with clean flavor, than 100 pounds of tainted or gassy milk. Both are objectionable, but to put into a vat of perfect milk the former would only hasten the development of the lactic acid, while the latter would permeate the whole vat and flavor it with its own objectionable flavor.

Now, in regard to the handling of milk, we have taken it for granted that cows are all healthy, having access to an abundance of good, pure water and salt, because I am of the opinion that too much of the bad milk delivered at factories is caused by cows drinking impure water, which should never be tolerated. Milk should receive the most careful attention. If milked in the stable it should be removed into a pure atmosphere as soon as possible, for if left standing in the stable—I care not how clean you may keep your stable—it still has the stable odor, and milk will become tainted in a remarkably short time. The stable flavor is one of the worst flavors makers have to contend with, therefore patrons will be doing them an everlasting favor by guarding against it to the best of their ability. Immediately after milking it should be removed into a pure atmosphere not found in a barnyard or close beside a hog pen. In regard to handling milk in the hot nights in summer, my opinion is that if milk is thoroughly aired either by dipping or pouring, or by the use of an aerator, it is not necessary to use water to cool it, and I think if water is used at all for cooling, the milk should be well aired before putting it into the water. By ærating the milk all animal odors and bad flavors escape, but to be of use it must be performed in a pure atmosphere; therefore the location of the milk cans over night is of vital importance. The milkers should keep themselves clean and tidy. After the milk pails and cans have been used they should be first washed in tepid water and then scalded thoroughly and placed in the sunshine, as sunlight is a wonderful germ killer. They should also be well scoured with salt at least once a week.

I want to say a word here in regard to washing of milk pails and utensils. I may be running into a hornet's nest but I can't help it. My impression is that there are too many dish cloths used in connection with the washing of dairy utensils and not enough boiling water. I know from experience that it is hard to keep a dish cloth sweet and clean in hot weather, and a brush that will take the place of a dish cloth can be bought any place for twenty-five cents, and is much better for getting into seams and crevices than a cloth, and it is no trouble to keep clean. Keeping milk cans clean and bright is no easy task, but leaving them unclean means gassy and bad flavored milk, and I think I can safely say that fifty per cent. of the bad milk delivered at factories to-day is caused by neglect on the part of the patrons to keep their cans and dairy utensils clean. Another practice that I have noticed is stopping up leaks in milk cans with a rag. This is positively a filthy practice and should be abandoned at once, unless in a case of emergency.

Now, in conclusion let me say, not trying to free the makers from all responsibility or trying to smooth over their mistakes and shortcoming, for they are many, that never in the history of the dairy business and in the face of low prices and keen competition did the farmers and dairymen need to put forth so much effort or use as much care in connection with their work as to-day. If a person is going to prosper in the dairy business financially he must study how he can get the most good, rich milk out of the feed his cows consume, and deliver the milk at the factory in as nearly perfect a condition as possible. Then he can hold the maker responsible for a first-class finished product, and is justifiable in doing so. Pure milk can only be obtained from healthy cows, pure food, pure water, pure air and cleanliness.

FEEDING DAIRY COWS.

By R. S. Stevenson, Ancaster, Ont.

To the farmers of Ontario who are engaged to any extent in the dairying industry the subject of this paper should be of the greatest importance, as their success depends very largely on their methods of feeding their cows. Judging from what we read in the agricultural press and in the valuable reports we get from the Agricultural College and Experimental Stations, great progress has been made in the last ten or fifteen years in the economical feeding of live stock. The educated minds of the nineteenth century are turning their investigations to the benefit of the farmer. The first essential in the care and feeding of dairy cows is the right man. There is no room in the dairy stable for the rough, ill-tempered fellow who is continually abusing and striking his cows on the slightest provocation. There is nothing that will cause a cow more quickly to shrink her milk both in quality and quantity than to be excited, from any cause. Chasing cows with a dog is another very bad practice. A few handfuls of bran placed in the mangers before the cows come to the stable is worth more than any dog.

The second essential to success in feeding is to have the right type of cows for dairy work. There is a great loss every year in trying to get milk in paying quantities from inferior cows ; we have far too many boarders among our cows. There certainly is no farmer who would tolerate having three or four idle men sitting at his table day after day, yet many farmers have cows in their stables that do not pay for their feed, to say nothing of the room they occupy, and the labor expended in caring for them. Now why is this? It is simply for the reason that the acts of the human loafer speak for themselves, but it is not so easy to detect the loafer in the stable, as the milk is usually pooled. The way to find out the robber cow is to get a Babcock tester and a pair of scales, and use them. The class of farmers that years ago recognized the necessity of some succulent food to keep up the flow of milk in winter, and supplied that want by means of roots, have found that the silo supplies this succulent food at the lowest cost, and a closer study of the wants of the cow and the composition of feed stuffs has given us a better idea of what to feed her and how to feed her in order to secure the best results. Now there is no doubt that the corn plant in some form must constiute a very large part of the ration for the economical feeding of dairy cows. There is no other plant that can compare with it, when we consider the quantity that can be grown on an acre of land. The difficulty in the past was to preserve the plant in the best condition. The silo has solved this difficulty in the most satisfactory manner, for with a good supply of ensilage made from well eared corn, a farmer is in the best possible position to feed his cows economically. Care and intelligence, however, are needed in forming a well balanced ration with ensilage as the basis, for, as ensilage is a food rich in carbo-hydrates, it requires some food that is strong in albuminoids to be added to it ; this is best supplied by means of peameal, bran, oil-cake, oat chop and clover hay. The proper proportions are, one part of albuminoids to five of carbo hydrates. In actual practice we do not usually get the exact proportion, but it is a guide for us, and the nearer we approach this formula the more likely we are to get good results. I have been often asked what is the proper amount to feed a cow? Now this is a difficult question to answer, as one cow will consume more than another, and what every feeder must do is to study the individuality of his cows, and whatever amount a cow will eat and digest is the proper feed for that cow. As it takes about two-thirds of a full ration to support the animal life, if we only feed that amount, we cannot get any return, no increase in flesh, no milk. It is from the other third of the ration that the profit comes, so that the more we get a cow to consume and digest over the actual food of support, the more profit we can get from her ; in other words beware of the shy feeder. Another fact which I believe is certainly true, is that cows can be improved by *continual* good feeding. Animal nature has the power of adapting itself to its surrounding, and as good care and liberal feeding will improve your cows, so, just as surely neglect and scanty feeding will cause them to degenerate. Some men say they want hardy cattle, meaning by that, ability to bear exposure and so forth. To those men I would say if they want cattle that can fight the battle of life alone without food and shelter they had better leave the improved dairy breeds alone and keep the class of cattle nature intended for that sort of life ; but they must remember that nature does not furnish us with cows that give ten thousand pounds of milk in a year. It is an impossibility for a cow to give much milk if she is kept in a place where the thermometer goes down to zero.

A time when cows often fail in milk is during the months of July and August, and to help over this period of short pasture it is necessary for us to sow some soiling crop as early as possible in the spring. A mixed crop of peas and oats, one bushel of the former to two of the latter, sown three bushels to the acre, will furnish the best crop we can get, and will be ready to feed just at the time our pasture is beginning to fall short. This crop should be followed by sweet corn sown as soon as the ground is warm enough. No farmer is studying his own best interest who neglects sowing some soiling crop. In many years' experience I have never known it to come amiss. Another important point in feeding dairy cattle is regular salting. We make a practice of mixing a little salt in their feed every day, and we find if this is omitted for any length of time, there is always a shrinkage in the milk flow. The importance of a supply of good wholesome water can hardly be overestimated, for as milk is about eighty-seven and a half per cent. water it is impossible for any cow to furnish a wholesome and good flavored milk if she is obliged to drink impure water. Several cases have come to notice during the past summer in connection with cheese factories, where badly flavored cheese was traced to the bad water the cows were drinking, and there is very little doubt that a great deal of the mortality, especially among your children and infants, could be traced to the impure water taken by the cows that supplied them with milk.

In conclusion, the man who would attain success in the dairy business must have a natural love for animals, otherwise he will not be likely to give his cows the same care and attention which is necessary in the dairy herd ; indeed the whole story may be summed up in the one word, comfort.

FEEDING AND CARE OF MILCH COWS

By John Robertson, Ingersoll, Ont.

The feeding and care of milch cows is one of the most important subjects connected with agriculture, and one which in many instances has not received that consideration from farmers which its importance demands. There are many farmers who keep cows, and do not know whether the cows are making a profit or causing a loss. The profit from a cow comes only when she gives more value than she receives, and only to the amount which she gives about what she requires. Every farmer ought to know just what every cow he has is doing for him. The question may be asked. What yearly profit should a good cow make? We answer, a good cow properly fed and cared for, is in equal partnership with her owner in the milk business, and everything considered she will make twice the amount in value which she receives. She takes one-half the proceeds for her share and her work, her owner gets the other half of the proceeds for his share and his work. If her owner fails to do his part well and does not supply her with plenty of good material, she may kept all the profit there is to herself and give him none, and would you not say, "Served him right." He failed to do his part of the agreement and had no right to a share in the profits of the business. The question of feeding milch cows is one which requires careful consideration. All cows are not alike in responding to good feeding ; some put on flesh, others make milk.

The prominent points in a good milch cow, irrespective of breed, are the following. She should be rather short in the legs, with a good sized body, a good length, and open between the ribs, a good breadth over the kidneys, with a good firm, straight backbone, long in the joints, good square hind quarters, and a good loose, flexible skin, a good long, well attached udder, with teats a fairly good size, set square, and a good distance apart, a good broad forehead and a good large clear eye, the neck clean showing some muscle but not much flesh. In general appearance she should be substantial, but not too neat. Not like a picture to look at, but one likely to do good work at the milk pail.

We may now ask the question, what is milk? Milk is composed of several constituents of solids held in solution in a large quantity of water in about the following proportions: 3½ to 4 per cent. of butter fat, 4½ to 5 per cent. of caseine, 4½ to 5 per cent. of milk sugar, and about one-half of one per cent. of mineral water. Or say about 13 per cent. of solids and 87 per cent. of water, is good average milk. You will see from this that the cow needs a variety of substances in her food and an abundance of good pure water or she cannot make much milk. The next question is, what is the milch cows best natural food? We answer plenty of good grass is her natural food. She is so constructed that she can take a large quantity of grass or other green feed and take the essence out of it and give it back in milk, which is one of the most nourishing food we have, and an article which, after being manufactured into cheese or butter, has brought more money into our Dominion, and added more to the prosperity and comfort of our farmers than any other one article the farmer produces. The next question is, what shall be done when the grass fails or when there is no grass? Well, get the next best you can, and remember always you are feeding for milk. In the early part of the summer if the grass is short, ensilage, saved over is a good supplementary food, or young clover or grass, partly cured, is a good help. Plenty of oats and peas, mixed and sown at different times, cut when in bloom, is the best green food, and comes nearest to grass of anything known at present. Have plenty of these to carry the cows into September, when there should be early corn well eared ready to cut. The large Southern corn with no ears if cut in August is of very little value to a milch cow; when there are no ears there is very little milk. For winter there is nothing cheaper nor better for the bulk of the feed than good corn ensilage, with one feed of straw at midday, for a rough feed, and a fair allowance of grain with a little cotton seed meal, while the cows are giving milk. Where corn is not grown, cut straw and mangels or carrots can take the place of ensilage very well, with same allowance of mixed grains as with the ensilage. Feed no turnips as long as the cows are giving milk. They are a fine, healthy food for dry or young animals, but not good, unless they are cooked, for making milk. If cows come in early and require house feeding for a length of time they should have a warm feed night and morning till they go on pasture. It is a great mistake to let cows run down in condition, or in the flow of milk, in the spring; if you do, it will be a loss to you the whole season. By bringing in cows in good condition, all the organs of the body which are associated with motherhood and the making of milk, are developed and brought into proper condition; if this is not done then, it cannot be done at any other time, and like many other things, if the opportunity is lost it never can be recalled.

Let us now consider the care of the cow. She does not need much care in the summer months, but in the winter she should have a good comfortable stable, clean, light and well ventilated. She should always be treated kindly, her wants well supplied, and she should have a good comfortable bed to lie on. I think that neither a plank nor a cement floor are very comfortable for a milk cow. I prefer an earth floor, with a plank or cement for their hind feet to stand upon and for the gutter, but in front of that I have never seen anything better than earth, no wind or cold can get under the floors. Stalls should be two or three inches lower in the centre than where the cow's feet stand. Put some bedding under the cows and they will be quite comfortable. If you keep her in a cold stable she will use part of her food to keep herself warm, and anything that annoys a cow or makes her uncomfortable will reduce both the quantity and quality of her milk, and take away some of the profit which should be saved by proper management. The commercial value of our cows is great. There is no animal nor single industry that has done more for Canada than the dairy industry. Our cheese factories and our creameries bring millions of dollars into the Dominion annually.

THE CURING OF CHEESE.

By. H. H. Dean, O. A. C., Guelph, Ont.

Temperature in the Curing Room. When cheese enter the curing room they are but *half* made. The proper curing of cheese is as important as the making. *Temperature* is the most important factor in the curing of well made cheese. The best temperature for curing cheese is from sixty to sixty-three degrees. Below sixty degrees too much moisture is retained near the outside, which causes discoloration, uneven curing, and poor flavor. Above seventy degrees, evaporation takes place so rapidly that curing is retarded rather than hastened, as moisture is necessary for the ferments which cause ripening. There is also loss by cracking of the cheese, loss in weight, and loss in butter fat, when the temperature of the curing room remains for any length of time above seventy degrees F. A prominent cheese buyer remarked recently that "the loss by evaporation and loss of butter fat from cheese in one year in the ordinary cheese factory would pay the whole cost of storing ice, and the cost of suitable ice boxes or racks for cooling the curing room during a hot spell. The arrangements for curing cheese are very deficient, and we have practically no means for controlling the temperature of curing rooms in hot weather."

How to keep the Cheese Warm during Cold Weather. The usual plan is by the use of an ordinary wood stove. This is not a satisfactory method, as the heat radiates from the stove and makes the cheese near by too warm, while those farther away are too cold. A cheese one foot from an ordinary stove receives 100 times more heat than a cheese ten feet away from the same stove. The point to be aimed at is to maintain an even temperature in all parts of the room *night* and day. Cheese should not be allowed to cool off at night; hence wood is not a suitable fuel to keep cheese at an even temperature.

The curing room should be properly constructed with paper and air spaces, to assist in controlling temperature. The method of heating may be by steam, by hot water, or by a warm air process which will cause a circulation of the air in the room. At the Black Creek factory, near Stratford, at the Strathallan factory, and possibly at others, they use a furnace known as the "Alaska," (made by Burrow, Stewart & Milne, of Hamilton, Ont.,) which gives entire satisfaction. Mr. R. M. Ballantyne, speaking for the cheese buyers of western Ontario, recommends this system as the best he has seen in use. The main features seem to be a heater surrounded by a galvanized iron casing, lined on the inside with asbestos and corrugated tin. It is so made that it allows a free circulation of air—cold air goes in at the bottom and warm air goes out at the top. The casing of the furnace should extend as high as the bottom of the highest cheese in the room (about six and a half or seven feet from the floor), so that the warm air may be conducted *above* the cheese. The casing should be so made that no heat is radiated therefrom into the room or against the cheese near the furnace.

The wholesale prices of these furnaces are:

No. 20	(capacity 12,000 cubic feet)	$35 00
No. 23	" 17,000 " "	42 00
No. 24	" 25,000 " "	52 00

How to Keep the Cheese Cool during the Hot Weather. A supply of ice should be stored during this winter for use next summer. To preserve ice it is not necessary to have an expensive building. Any sort of building which will shed water and allow the melted ice to flow away from the body of unmelted ice will answer the purpose, if it be properly packed in sawdust, around and over the ice. Pack all openings between the blocks with broken ice. *Now* is the time to prepare for next summer's hot weather, and thus prevent loss of cheese. Store plenty of ice (eight to ten cords for an ordinary factory), and use freely in hot weather.

There are several ways in which the ice may be used in the curing room. In the curing room at the Ontario Agricultural College dairy, we use, for holding the ice, a large open pan of galvanized iron, which sits on the upper shelves of a cheese rack. This pan is about six feet long, two and a half feet wide, and three inches deep. In one corner is an inch hole, which is connected with piping to convey the melted ice outside. This is a simple and effective method in a small curing room.

For a larger curing room with high ceilings, the plan adopted at the Black Creek factory is satisfactory. Ice boxes are suspended from the ceiling and supported by a cross piece from two of the uprights which are used for supporting the cheese shelves. The boxes are lined with galvanized iron on the sides and bottoms, and form a trough in the centre to catch the drip, which is conveyed outside. In the boxes are racks for holding the blocks of ice. These racks may be taken out at any time. The size of the racks is three feet wide and ten feet long. There should be three or four of these in an ordinary curing room, 30 x 40.

Another way suggested by Mr. Ballantyne is to build a box, say 4 x 6 x 6. Have the box lined with galvanized iron, and open at top and bottom. Place the rack and ice in this box, and provide for the outflow of water. Or, in this box place galvanized iron cylinders, about two feet in diameter, and fill them with broken ice and salt. In this way the temperature can be very quickly reduced.

The Sub-earth Duct. In order to maintain an even temperature and a moist atmosphere in the curing room, what is known as the sub-earth duct system is possibly the best. This duct should be about 100 feet long and 6 to 10 feet deep. In the bottom of the trench place six to ten rows of six inch drain tile. Have an inlet for the air, whose mouth faces the wind and which is higher than surrounding objects, thirty to fifty feet. The outlet for warm air from the curing room should be higher than the inlet. The total cost will be about $100 Mr. H. C. Alves, Johnsonville, Wis., says "I would not take $1,000 for mine." We are building one at the dairy of the Ontario Agricultural College, and will give results next year.

ECONOMICAL PRODUCTION OF MILK.

By J. S. Woodward, Lockport, N. Y.

No question is more important to the dairyman than the economical production of milk. By this is not meant the production of cheap milk, but the cheap production of good milk. In these days of electricity and close competition with consequent low prices, it becomes the farmer to so learn his business as to produce everything on his farm at the very lowest cost. We must live from the farm and in order to do so must make a profit on what we raise, either in their sale or by working them up on the farm. It often happens that when a crop cannot be sold so as to cover the cost of production that it can be worked up on the farm, by some of our domestic animals, so that what results from its consumption can be sold, so as to show the desired profit. The dairy affords one of the most available means for accomplishing this end.

Milk is a finished product, made by the cow machine, from grass and other forage and grain as raw material. The quality and quantity of milk depends upon the individuality of the cow and the kind of food furnished. Somebody once said "The proper study of mankind is man," but I want to add that the most *profitable* study for the dairyman is the cow. "Cowology" should be our study until we know all the requirements of making a quart of good milk for the least money. In the solution of this problem five factors are involved—the cow, the stable, the food the water and the care.

The Cow. There is an immense difference between the best and the poorest cows. One will eat our food, take our care, and steadily and surely run into debt. The other, on the same food and with no more care makes so much milk as to show a satisfactory profit even at the present very low price of milk. Two cows standing side by side in the stable at Cornell University were making milk, the one at a cost of only 46 cents per 100 pounds, the other at a cost of $1.32. What we want to know is how to select the forty-six cent cow and reject the other. No one can deny that there is a great difference in breeds, but I do not propose to get into hot water by discussing breeds in this article. If I were to give my opinion on this matter it would be that for a dollars and cents dairy, a judicious crossing of breeds would show larger returns than any full blood or thoroughbred. There is something in the co-mingling of blood, even in men, that adds the strength, vigor, and productiveness that helps them to "get there and on time." But no matter about the breed, there are certain marks, characteristics and modifications of shape or form, that shows the dairy type. Put the best cows of the various breeds, cross-breds or natives side by side, and we shall be struck by the great similarity between them in the dairy points.

No cow can make much milk unless she has large storage for food—her abdomen. This should be so large that when standing square behind her you cannot see her shoulders. Still she must also have a capacious chest so as to give her abundance of lung room, to consume oxygen to purify her blood and furnish heat to run the machine. Her neck should be long and slim, tapering clear to her head—"a regular ewe neck." A head, wide between a pair of prominent bright eyes, with a long tapering face to a heavy muzzle, with a wide mouth and strong jaws. Her legs should be very slim, not over long, and her hind legs should bow out and have so little developement of the "round" as to be called "cat hammed." What we want is abundant room for a large udder, and this well supported by strong udder cords, and from this udder there should run large, well developed udder or milk veins, having the openings where they enter the abdomen (milk wells) large enough to admit the finger ends. Her tail should be slim and so long as to bring the switch down below the hocks. Her back should be straight or hollowing, with the vertebrae far apart and prominent. In short, her whole organization should be open and loose. The secretions of her skin should be abundant and yellow, especially up between the udder and thighs and inside the ears. Having a good showing in all these points, by using a Babcock milk tester and a pair of scales no one need go far wrong in selecting a good cow, if he knows how long she has been in lactation.

THE STABLE. No matter how good a cow we select we must not expect her to do her best unless the place in which we put her is perfect. It will not do to think our cow can "rough it," sheltered only by a wire fence, and give the most or best milk. We must not lose sight of the fact that all the foods eaten and digested goes to one of two functions—sustaining life or production. That used in sustaining life—keeping the machine running—called maintenance ration, is by far the larger part—it may be all—and from this we can receive no profit. The profit comes, if it comes at all, from food eaten in excess of the maintenance ration, and which may be called the productive ration. It behooves us therefore, to see if, by modifying the conditions, we cannot reduce the amount of food required for maintenance to the very lowest point. The average temperature of the cow is 102 degrees F., much warmer than man's, which is only ninety-eight degrees, and this must be maintained no matter what the surrounding conditions may be. Under the most favorable conditions seventy per cent. of the maintenance ration is used as fuel to keep her warm. The more severe the cold she endures the more fuel (food) will be required to be burned to keep her warm. It follows then, that to make milk cheaply she must be put and kept in a warm stable. The warmer the better up to a summer temperature. But we must not forget that she requires pure air as well as warmth, so we must have our stables well ventilated. We must also see to it that they have plenty of light and be absolutely dry. It will not do to put our cows into a damp, dark, ill-ventilated stable, and then think that by turning them out into the open air and bright sunlight for an hour or two each day, we will fulfil the requirements for making good milk, to say nothing of cheapness. Every hour they are shut in such a prison their vitality is lowered, and disease invited—no cow can profitably assimilate food, or produce milk in such quarters. Either make the hygienic conditions of the stable right or leave the cow out all the time.

The other three-tenths of the maintenance ration are used to digest the food or sustain exercise. If we feed an ox and a cow of the same weight on the same amount of like food, the cow giving milk and the ox working, the ox will show no gain, the energy which the ox derives from the food, equivalent to that which the cow puts into milk, will be used in work. If then the cow is caused to work the same as the ox, she would cease to give milk, or grow poor. From this we should learn to keep our cows with no more exercise than what is absolutely necessary for their health. We will all agree on this, the only disagreement will be in deciding how much or how little is the necessary amount. I am one who believes that if a cow be put into a hygienic stable with such environments as to make her perfectly comfortable, she will not need to see the outside from November until going to pasture in spring. My cows never go out in winter time, but they are never confined in any kind of a stanchion. I regard all such as relics of barbarism, and, think no Christian man can consistently so confine his cows. The finest and most sensible fixture in which cows were ever kept, (I hate that word "confined.") is the Bidwell stall, a little box stall, with a movable manger, for each cow, in which they are as comfortable and kept as clean as if in a pasture; but, if not these, then they should be tied by the neck in such a way that they can lie down either side up and put their heads around in an easy natural position; and when so housed in a proper stable, no necessity will exist for their going out for exercise or any other purpose.

THE FOOD. As has been stated, a large share of all food eaten goes as maintenance food. In a perfect stable, with all the conditions just right, about eighteen pounds of good mixed hay, or its equivalent, will be used each day by a 1,000 pound cow, to simply exist. If no food is given beyond this no production of milk can take place, except at the expense of the cow's condition. The cow must first be supported—and she will be in spite of us—and we can only expect production when we give food in excess of the maintenance ration. Dr. Lehmann made some very instructive experiments, as recorded by Prof. Henry in his very excellent work "Feeds and Feeding," in which a flood of light is thrown on this question of feeding cows. He shows that the same cow that was kept in the pink of condition on 18 pounds of dry matter in hay, in a perfect stable, ate all the way up to 25 pounds as she was placed in a less favorable condition. That when turned out for a couple of hours each day as cows are usually treated, she ate 21 pounds with no gain, or milk production. He then continued to show the cost of milk production, in food beyond this point. With an increase of food, the production of milk steadily increased and its cost decreased. His experiments were so instructive that I compile and include the following table:

How kept.	Dry matter eaten.	Protein.	Carbo-hydrate.	Fat.	Nutritive Ration.	Milk produced	Pounds of food for one pound of milk.
	lbs.	lbs.	lbs.	lbs.		lbs.	
In warm stable	18.	0.7	8.0	0.1	1:10	.....	.. ..
In cold "	25.	0.9	12.7	0.6	1:14.7	.....	.....
In warm stable, out 2 hours each day	21.	0.9	12.	0.2	1:11.6	......	.... .
" " " " "	25.	1.6	10.	0.3	1: 6.7	11	2.27
" " " " "	27.	2.0	11.	0.4	1: 6	16.6	1.63
" " " " "	29.	2.5	13.	0.5	1: 5.7	22	1.32
" " " " "	32.	3.3	13.	0.8	1: 4.5	27.5	1.16

By this table we see that when eating 25 pounds of dry matter in the cold, no milk resulted, and the same when eating the 18 and 21 pounds under more favorable conditions, so that in each case the food eaten was entirely wasted so far as production of milk was concerned. That when eating the 25 pounds of dry matter under ordinary conditions 11 pounds of milk was made at an expense of 2.27 pounds of dry matter for each pound. But as the ration was increased, for each two pounds of dry matter the increase of milk was about 5.6 pounds and at a gradual reduction in the amount of dry matter, until when eating 32 pounds, it only took 1.16 pounds of dry matter to produce a pound of milk.

Another fact should not be overlooked. Had the cow when eating the 32 pounds been in a warm stable, with the same proportionate increase of milk for the food saved, she would have given 35.9 pounds at less than nine-tenths of a pound of dry matter used to yield each pound of milk. It will be further noticed that when four pounds of dry matter was given beyond the 21 pounds of maintenance ration, that 11 pounds of milk was the yield, but that by addition of another four pounds, 22 pounds resulted, so that by adding only four pounds, or about one-sixth to the food, the product was doubled. This is a very interesting and instructive table, and shows clearly that the net as well as the gross profit increases with the amount of food given, up to the limit of the ability of the cow to digest and assimilate. It follows, then, that the best cow is not the one that will give the *most milk* from the *least* food, but the one than can eat the *most food and give milk in proportion to the food eaten.*

The character of the food has much to do with the ability to digest and assimilate. To do her best, any cow must have food adapted to the making of milk. If we analyse milk, it will be found to contain about one pound of protein to four and one-half of carbohydrate, but the food must not be so narrow in its ratio, for the maintenance ration is largely used to keep the cow warm, and the carbohydrate of the food is the fuel; so the ratio in her food should vary with the environments, but should be about one to six usually. Suppose for instance, that the cow be fed on timothy hay, straw or corn stalks for forage, with corn meal for grain. The nutritive ratio of all these is so very wide that she could not eat enough to furnish the necessary protein to form the casein in a normal quantity of milk, so the yield would be light; and should the meal be increased to furnish more, she would at once begin to fatten and the natural tendency would be to decrease the milk yield. Now, suppose that we went to the other extreme and fed clover hay and pea straw for forage, and wheat bran, gluten meal and pea meal for grain, all nitrogenous foods; we should have such a narrow ration that she could not get enough carbohydrates for a large yield, and she would absolutely take fat from her own body to put into the milk, until she grew so poor as to have no more to part with, and in both cases the milk yield would be less than normal. What is needed is to so compound the ration as to furnish the needed elements, and then to feed freely. There is an element of food that aids digestion wonderfully—*succulence*. Let me illustrate; ninety pounds of lawn clippings given fresh to a cow each day will enable her to give a nice flow of milk, besides keeping her in splendid condition. Dry the same in the best manner and it would not long support her, even though giving no milk. Succulence adds also to the palatability of foods, and this has much to do with the ability of the cow to eat and digest. What we really like agrees much better with us than those things for which we have no relish.

Having learned of what the cow's food should consist, and how to mix and compound it, our next inquiry should be where can we find these food elements in the best form and at the cheapest price. As the price of feeding stuffs vary so often and so much, there can be no arbitrary rule laid down to direct purchasers. We should keep posted as to prices and food values, so as to take advantage, and buy the cheapest that will supplement what we raise on the farm. It is a safe rule, to raise what we can on our farms of the food for our cows, but often we can exchange some crop which we have raised for some other commodity with a greater feeding value, and at the same time make a profit in the trade. We should always be ready for such an exchange. A cow in full flow of milk will require for each 1,000 pounds live weight not less than two and a half pounds protein, twelve and a half pounds carbohydrate, and one-half pound of fat per day. The carbohydrate being so much the largest amount, let us see where we can get this most easily and cheap. Wherever in Canada the climate will allow of the growing of Indian corn to the full glazing state, no crop can compete with it in furnishing carbohydrate cheaply and in the most desirable form for the cow. Each acre that will give one and a half tons of hay, will grow of the smaller and earlier kinds of corn even, ten or twelve tons, and, if kept in the best manner, each two and a half tons of this will be worth as much as a ton of hay. I know of no way in which this corn can be so economically preserved and be so valuable as cow food, as to be put into the silo. Besides, the silage has the advantage of succulence which, as has been shown, adds greatly to its value. It is evident then, that for a base of cow food for economical production nothing can compare with corn, wherever it can be grown; and in no other way can it be made of so much value as by putting in the silo. Let us see; when corn is at its best, the glazing state, it has a certain value, represent that by 100; forty-five per cent. of this will be in the ear and fifty-five per cent. in the stalk and leaves. Of the fifty-five per cent. in the stalk and leaves, sixty per cent. will be in the stalk, below the ear, which will be thirty-three per cent. of the whole value. The feeding value of the ear is mostly in starch, in the stalk in the form of sugar. From this time to full curing the changes in the stalk are all against the farmer, for while the sugar is all digestible, in the ripening and curing process it gradually changes to starch and woody fibre, and becomes less and less digestible, and thus loses much of its feeding value. While the stalk at its best was filled with sweet juice, that fully cured, found in the rick or shock, has not a trace of sweetness left; it has changed to wood or been washed out. But where corn cannot be grown, millet or Hungarian grass can be made to take its place, or hay must be substituted. But suppose we have plenty of silage as the bulk of our cow food, and to furnish the carbohydrate from whence shall we get the two and a half pounds protein? If feeding forty pounds silage, the proper amount, the cow will get less than a half pound of protein. Where shall we find the other two pounds? Of course we must have some dry food with the silage. Suppose we use the timothy hay; to get the two pounds protein she would have to eat seventy-five pounds, a quantity much beyond her ability; besides we can get more than double the quantity of protein in clover hay and we can get the clover much cheaper, so we had better use the clover for the dry forage, or where peas are grown, well cured pea vines are a fine source from whence to draw a part of the needed protein. But with either, the cow cannot eat enough to furnish the requisite amount, and so we must look to some of the concentrated foods for the bulk of this. But, luckily for the Canadian farmer, peas do splendidly with him, and he can grow much of the requisite protein on his own farm. What more is needed can be had very cheaply in many of the by-products from the south and west—in wheat bran, cotton-seed meal, linseed meal, gluten meal, etc., whichever are most plentiful and cheapest.

WATER. We now come to that in the needs of our cows which, while of the most importance, receives the least attention. When horses and cows stand side by side in the stable, the cows giving milk, the horses standing idle, the rule is to water the horse three times a day while the cows are lucky to get it once regularly. No cow can do her best when so watered. If in full flow of milk she requires from 90 to 120 pounds of water, about 15 gallons every day. It is simply impossible for her to drink this amount at one time. A cow having water always accessible, never drinks because thirsty. She never gets up in the morning and drinks on an empty stomach; horses do, but the cow drinks to keep the contents of her stomach in the best condition for rumination. She wants to drink a little and often. If she can have water accessible she will drink twenty times in twenty-four hours. When we say a cow is eating she is doing nothing of the kind; she is simply gathering a supply into her storehouse, the first stomach, and then she gets into some quiet corner and with eyes half closed she does her eating—ruminating. Then is when she wants the water. Hence we see how very important that a supply be always within reach.

CARE. We now come to the last but by no means the least thing in cheap milk production—care. We are sure to see that the horses have a good bed, are carefully groomed every day, and kept entirely clean, and, if the stable is the least cold, we are careful to keep them well blanketed. All this is well, it saves feed and pays. But is there any reason why the horse, doing nothing, should have all this care, and the cow, paying a good profit, get none, not even a good bed to lie on? There is no mistake but that a clean stable, an abundant soft bed, keeping clean, and a reasonable amount of grooming every day, will pay better for the cow than for the horse. She should be made as comfortable as possible, the stable should be light and warm, and if not so warm as never to freeze, it should be made so, or the cow given a good warm blanket; she will pay for it. Above all things she should be kept in a quiet, contented frame of mind. Anything and everything that in any way disturbs her—loud talking, swearing, a stranger in the stable, milking by a new hand—any and all of these have a tendency to diminish the milk yield, and anything that does this is surely not favorable to economic milk production.

To sum up; get good cows, make the stables hygienic in every particular, keep the cows constantly housed, feed high on well balanced food, give plenty of succulent food, have clean fresh water always within reach, and take good care of the cows if you would make the most milk for the least money, and have no occasion to go about the streets saying that dairying "don't pay."

THE SPECIAL PURPOSE COW.

By Justus Cohoe, New Durham, Ont.

To introduce this subject I may say that I am a believer in special farming, not altogether as opposed to mixed farming, for in a country like ours, where nearly all the cleared land is tillable, cultivation of the soil with a rotation of crops is highly desirable. Hence, some variety of crops will be produced, but I am confident that a large majority of farmers will be more successful if they have some specialty to which their best thought and attention is given, and a special equipment or outfit for that one thing is procured and an endeavor made to become experts in that particular line. The raising and keeping of some class of farm stock will, in most cases, be the best thing to choose for a specialty. All should not be dairymen, but each may choose some particular class for which his circumstances and tastes are best suited.

Then, if it is wisest and best for the majority of farmers to give special prominence to the production of some particular thing, the one who makes dairying a specialty will find a decided advantage in the special dairy cow. She would have a large percentage of the blood of some one or other of the dairy breeds, but may be without any particular breeding. In one particular, however, such a cow will probably be found wanting—that is in her ability to produce a calf as good or better than herself, unless she is bred to a pure bred sire of some dairy breed. The special dairy cow in her milking season of nine or ten months should give not less than 6,000 pounds of milk, and up to 10,000 pounds with kind and generous treatment.

Her general appearance has often been described. I will merely say that as a rule she is light in front, heavy behind, deep in the middle, and generally has a broad, well-defined escutcheon, prominent milk veins, crooked and branching, ending in a capacious udder with four well placed teats, from which it is not difficult to draw the milk ; a thin, rather long neck, fine head, with full, bright eyes. Mrs. E. M. Jones says the dairy cow should be long, low and level. Sometimes, however, an excellent cow is of quite a different build from that described. Two other qualifications, which are not so apparent to the eye, she must possess or she will not be satisfactory, viz., a good constitution and strong digestive power.

The man who keeps his cows on pasture alone from May until October, does not need her. The man who thinks it wasteful to buy some grain feed to make a proper ration for his cows is not likely to find much profit in the special dairy cow, and the man who has no love for the dairy business had better not spend money on her. The man, however, who makes dairying his leading business, and determines to make a success of this line, giving his cows a chance to do their best, will find her a source of profit and satisfaction. If bred to a pure bred sire of the right type, her heifer calves will have special value for the dairy, and if the cow is pure bred her calf will have a greater value—first, because it has value for breeding purposes ; second, because a heifer has greater value for the dairy on account of its ancestors having been long bred along dairy lines, and therefore are able to transmit dairy qualities to their offspring with a degree of certainty. In addition, the pure bred has an extra market value on account of reduced transportation rates on thoroughbred stock obtained through the Live Stock Breeders' Associations. They are also allowed to pass from one country to another free of duty, thus having a larger market. But pure bred or cross-bred, she is able to give milk enough to make a profit for her owner.

The following figures are in the line of my own experience, and show that the special purpose cow is quite able to pay for the extra feed she eats and still maintain her superiority over the common or general purpose cow. We will put the price of milk low—sixty cents per hundred. The average dairy cow gives about 3,500 pounds of milk. Add to this 500 pounds for spring and fall milk and we have 4,000 pounds, which, at sixty cents per hundred, amounts to $24. Now take 7,000 pounds of milk, which is not an extreme average for a herd of special dairy cows; 7,000 pounds at sixty cents per hundred gives $42; but 2,000 pounds of her milk should be given in winter and made into butter; 2,000 pounds of skim milk, at twenty cents per hundred, places $4 more to her credit. She still has 1,000 pounds more extra milk at the cheese factory, the whey from which, at five cents per hundred, amounts to fifty cents—giving a total credit of $46.50. From this take $10.00 for extra feed, and we still have $36.50, a balance of $12.50 in the special cow for a single season. $12 50 multiplied by 15 (an ordinary number of cows kept on a hundred acre farm) gives $187.50. Now if the common cow is not kept at a loss, this is all profit—a very satisfactory return at present prices.

HORTICULTURAL DEPARTMENT.

SPRAYING AN APPLE ORCHARD.

By J. Edwin Orr, Fruitland, Ont.

The spraying of fruit trees, for the purpose of protecting the fruit and foliage from the ravages of injurious insects and fungi, has passed the experimental stage—it has been demonstrated to be a success. The people are gradually awakening to the fact that, in addition to the proper cultivation, pruning and fertilizing of an orchard, spraying must be done, and done in a thorough and systematic manner, if our orchards are to produce regular crops of first-class fruit. The loss annually accruing to the apple growers of Ontario through the neglect of their orchards is enormous. There was in the Province in 1896, 320,122 acres of orchard and garden, the number of apple trees was 9,500,000, of which almost 6,000,000 were in bearing. From observations in connection with the experimental spraying of fruit trees conducted by the Department of Agriculture for Ontario, covering the whole Province and extending over a number of years, it has been shown that less than 25 per cent. of the apple crop is first-class fruit, and it has been demonstrated that by proper spraying this percentage can be raised to 80 or 90 per cent, and in some cases to 100 per cent. And not only is the percentage of clean fruit greater on sprayed trees, but the fruit is larger, brighter, better flavored and possesses superior keeping qualities. This will readily be conceded when we remember that by spraying we keep the foliage in perfect condition, so that the tree is full of life and vigor and capable of producing the maximum results.

One of the chief factors in successful spraying is a good pump. No pump is cheap which will not do its work properly. In selecting a pump, therefore, the following points should be carefully considered: (*a*) Ease of operation; for the work in most cases will be performed by hand and if the pump works hard a lack of pressure is sure to be the result; (*b*) Evenness of distribution. The "Boss" nozzle, which used to be supplied with spray pumps, is a back number now. The nozzle selected should be easily cleaned and of a kind which will break the solution into such fine particles that it leaves the nozzle like a fog. When the nozzle is working properly and the sun is shining you will see a rainbow on the spray, so fine must it be broken. Every one has noticed how much more moisture remains on a tree or on the grass after a heavy dew or fog than after a sudden dash of rain. This is exactly the difference between spraying the trees properly and drenching them. I believe that three-fourths of the so-called spraying is not spraying at all, and that this is the reason why so many fail to get satisfactory results. Also, when the trees are drenched there is a loss of material, for all which drops from the tree is lost. As it is impossible to throw so fine a spray to a considerable height it is necessary to use an extension rod, which may be made of a piece of bamboo the required length, into which there is fitted a brass tube; at the end of this rod the nozzles are fixed, and in this way a man can pass the rod around and through the tree and reach every part effectually without much loss from dripping; (*c*) Compactness. The pump should be as simple and compact as possible, and as much as possible should be inside the barrel. I much prefer the pump mounted on the side of the barrel than on the end. It is considerably lower and therefore easier to work and less liable to upset; besides the motion of the wagon agitates the mixture better; (*d*) Durability. The various mixtures used in spraying, some of which act chemically on the metal of the pump and the neglect the pump often receives from not being properly cleaned after using, makes it necessary to have a pump the more important parts of which are of brass and which are easily detachable so that that they may be renewed at small cost; (*e*) Power. To break the mixture up into the fine spray before referred to, it is necessary that the pump should possess considerable power. This is of prime importance, and before purchasing you should thoroughly satisfy yourself that the pump is capable of performing the work required of it. The day has gone by when we can afford to use one line of hose and a single nozzle. The work can be done just as well and much faster by having two lines of hose and a Y with two or three nozzles at the end of each. Thus with one man at each hose and one man pumping, three men can do three or four times the work of two men with a single nozzle. Be sure then, if you have much spraying to do, that your pump possesses the necessary power; (*f*) Agitation. As some of the ingredients used in spraying are not dissolved, but only suspended in the solution, it is necessary that it be constantly and thoroughly agitated to keep them from sinking to the bottom of the barrel and thus making the mixture of uneven strength. A mechanical device which stirs the mixture with every stroke of the handle is the best. A return stream is less effective and lessens the pressure considerably. With a pump filling the above requirements, fixed firmly in a wagon, the work should go on smoothly.

As to the solution to be applied. For masticatory insects, such as caterpillars and beetles, use 1 lb. of Paris green to 200 gallons of water. For suctorial insects, such as aphides and scale insects, use kerosene emulsion made after the following formula.

Hard soap	½ pound, or soft soap, 1 quart.
Boiling water (soft)	1 gallon.
Coal oil	2 gallons.

After dissolving the soap in the water add the coal oil and stir well for five to ten minutes. When properly mixed it will adhere to glass without oiliness. A syringe or pump will aid much in this work. In using, dilute with from nine to fifteen parts of water. Kerosene emulsion may be prepared with sour milk (one gallon), and coal oil (two gallons), no soap being required. This will not keep long.

For treating the scab use Bordeaux mixture, according to the following formula.

Copper sulphate	4 pounds.
Lime (fresh)	4 pounds.
Water	40 gallons.

Suspend the copper sulphate in five gallons of warm water. This may be done by putting it in a bag of coarse material and hanging it so as to be covered by the water. Slake the lime in about the same quantity of water. Then mix the two and add the remainder of the forty gallons of water.

It is best to combine the Paris green and the Bordeaux mixture and in this way apply a combined insecticide and fungicide. The results appear to be as good as if each were applied separately. The proper treatment for an apple orchard, then, would be as follows:—

Treatment for destroying *codling moth, bud moth, tent caterpillar, canker worm, apple spot* and *leaf blight.*

First spraying: Bordeaux mixture and Paris green (4 oz. to the barrel of the mixture) when the buds are swelling.

Second spraying: Bordeaux mixture and Paris green before the blossoms open.

Third spraying: Bordeaux mixture and Paris green when the blossoms have fallen.

Fourth and fifth spraying: Bordeaux mixture and Paris green at intervals of ten to fifteen days, if necessary.

No definite date can be named at which it would be safe to cease spraying for apple scab. The orchard should be watered after the third or fourth application and the applition again made if scab appears on fruit or leaves. Many apple growers who sprayed thoroughly until the end of June in 1897, and who neglected to watch their orchards afterwards, lost heavily. The scab appeared very late in the season last year, and all the orchards in which the Government work was done had an extra spraying in July, which probably accounts for the splendid results obtained. The green aphis was very bad last year and should be carefully watched for. The egg may be found deposited in cracks of the bark of the twigs and around the base of the buds. As soon as the buds swell these lice will hatch and commence sucking the sap from the bud. This is the time to apply the kerosene emulsion. Do not wait until the leaves are out and curled over the lice. As the emulsion only kills by contact with the lice the earlier after they hatch and the more carefully the work is done the better. The Oyster Shell Bark Louse is very common in Ontario and is causing serious damage to many orchards. If one of these brownish scales is turned over in March it will be found to contain a number of light-colored eggs; these will hatch about the end of May or early in June, and this period should be closely watched for and an application of kerosene emulsion made during the two or three days the lice are running. It must be remembered that it is contrary to law to spray fruit trees with poisonous substances during the blooming period (vide Statutes of Ontario, 55 Vic., C. 19.) This act is for the protection of bees, and, leaving out the consideration of the duty of evey citizen to obey the law, it is to the interest of every fruit grower to protect bees as they play such an important part in the fertilization of the blossoms. It has been proved by careful experiment that feeding on blossoms sprayed with arsenites is fatal to bees. The work can be safely omitted during this period if the first two applications have been made. As insecticides are poisonous care should be taken in working with them. They should not be used when there is any wound or abrasion of the skin exposed, and care should be taken not to allow the spray to settle on the hands or face or to be inhaled. Arsenites taken into the system by absorption or inhalation produce symptoms of poisoning. In mild cases they resemble the symptoms produced by poisoning. In severe cases headaches, nausea, eruptions and ulcers are said to result. The danger from arsenites which are soluble in water, such as London purple, is much greater than from Paris green which contains very little water soluble arsenic. There is more danger of poisoning by absorption when prespiring freely. By taking proper precautions, however, there need be little fear. A leather washer about four inches in diameter should be fitted to the hose or extension rod just below the nozzle. This will prevent the drip from reaching the hand. As far as possible keep to windward of the nozzle. When much work is to be done rubber gloves should be worn. The face and exposed parts should be washed immediately after spraying.

Spraying is not an exact science, so that no one should hesitate to undertake it. And although the results are in exact proportion to the care and experience of the operator yet excellent results may be obtained even by an amateur, if he will follow directions closely. The cost of spraying is not very great. Copper sulphate of the best quality can be had at from four and a half cents to five cents per pound by the barrel and Paris green at from fifteen cents to twenty cents per pound. The cost of material for treating an orchard properly for a season with Bordeaux mixture and Paris green should not be more than from four cents to five cents per tree. Surely if a tree is allowed to occupy the ground and worth keeping at all, it is worth attending to properly. There is no department of mixed farming which will pay better for a little care at the proper time than apple growing. If we can put up and ship to England apples, which are first-class and which may be relied upon as being honestly packed, the market is simply unlimited and the price assured. A shipment of "selected" Newtown Pippins, which were sent by S. S. Paris, sold in London early in October at thirty-six shillings per barrel. That is the class of goods it pays to produce and that is the class there is always a good demand for. It remains with the growers to choose if they will produce that class of fruit.

THE EFFECT SPRAYING HAS ON BEES.

By R. F. Holtermann, Brantford, Ont.

The relationship between the bee-keeping and fruit-growing industries, through the work of cross fertilization by the honey bee, is at present so well recognized that it is not necessary to more than say that anything which injures the bee prevents her from doing this important work. To spray fruit trees when not in blossom does not interfere with the honey bee. To spray during fruit blossom when the latter are secreting nectar for the purpose of attracting the insect and distributing pollen when rifling it of its nectar, is very injurious to the honey bee.

The honey bee has a highly developed nervous system, and for that reason, considering its size, falls an easy prey to quantities of poison which would have no effect upon other insects of a similar size. And the quantity of poison which would be fatal to the bee would have to be multiplied many times to have upon larger animals even the effect of a mild tonic, as prescribed by physicians.

The way in which the poison reaches the bee is as follows: Attracted by the odor of the blossom she goes long distances from the hive; as she nears the flower she locates it, depending much upon her eye as the guide, and enters it, rifling it of its nectar. The nectar, through the spraying mixture, has a very small percentage of the poison. This mixture is taken up by the bee and enters the honey-sack, not the true stomach. I do not know if the effect upon the bee varies according to the percentage of poison or depends upon the question at to whether the bee allows a portion of the nectar to enter the true stomach for its own support. It appears to me likely that in either case the bee may perish. The result, however, is this: In many cases bees perish at the tree, in others on their way to the hive, and still others loose their lives after returning to the hive. This is not all. The bee undergoes all the stages of a true insect, namely, the egg, the larva, the pupa, and lastly the imago or perfect insect. During the larval stage it is fed pollen and honey by the mature insect; this food, containing only a very minute percentage of the poison, is much more fatal to the bee when in the larval or grub stage, and in this way many partially developed bees are destroyed.

The loss then is two fold, or to use a well known term, the candle is burned at both ends. The old bees are destroyed and so are the embyro bees which should go to take the place of those who have served their day and generation, and die a natural death, and in addition, to build up the colony for the honey flow. In this way it will be seen that a colony may be totally destroyed through spraying during fruit bloom, or, as a result, be in so weak a condition numerically that it can give the bee-keeper no surplus honey when the proper season arrives. By the surplus honey season we mean the time when the bees gather more honey than they require for their own use and when that which is taken to market is reduced; this season does not arrive until later, when clover blossoms open. An effect of less importance to the bee-keeper, but of greater importance to the fruit-grower, is that the bees have been decreased in numbers until unable to fully carry on the work of cross-fertilizing fruit blossoms by distributing pollen. This, and not the gathering of honey, is the primary object of the existence of the honey bee.

ORNAMENTAL TREES AND SHRUBS FOR THE FARM.

By W. W. Hilborn, Leamington, Ont.

Too little attention is given to the culture of ornamental trees and shrubs on the farm. In a general way none but a few of the old standard varieties have been planted. This is to a large extent owing to the fact that the demand for ornamental trees has been limited, and our nurserymen have not gone into the propagation of the more rare and beautiful kinds. Most of the ornamental stock that has been planted throughout the country has been sold by travelling agents. They have done a good work, but have not gone far enough in this direction, as they sell only a few well known sorts that have been grown by the firms they represent.

I often think, when driving through the country, that it is no wonder so many farmers' sons leave the farm and go to the already overcrowded cities where their surroundings will be more congenial. Farmers as a class are very busy people and the majority of them think they have no time to bother with ornamental trees. Did you ever notice that it is those who have most to do who give most attention to ornamenting their homes with nice lawns, trees, etc.? How often do we see a farmer build a fine house and give no attention whatever to the grounds? Such a place, no matter how much it cost, is not worthy of the name of *home*. A few dollars spent in the purchase of ornamental trees and shrubs, and a little time given to the planting and cultivation of them, will add so much to the appearance of a home. I believe it will not be long till this subject will receive more attention by our farmers. It is not unusual for a farmer to buy a pretty tree or shrub from some travelling agent, plant it out, possibly in the sod in front of the house, and then consider his duties ended. Many people appear to think that a tree when planted should know enough to take care of itself. My advice would be, never plant a tree until you have firmly made up your mind to give it thorough cultivation, especially during the first few years after planting. Without this you cannot hope for any great measure of success. By keeping the soil constantly stirred around the trees during the growing season, you preserve a mulch of loose earth at the surface, which prevents the evaporation of the moisture contained in the soil; this is most essential to the growth of the tree.

Evergreens are usually hard to transplant unless they have been properly grown. The roots are full of resin, and therefore dry out very quickly when exposed to the air. They should be transplanted at least once in every two years until they are planted where they are to remain. I have had the best satisfaction when I bought quite small trees and planted them in nursery row in the garden where good cultivation can be given. If they are thus planted in nursery row when ten or twelve inches high, and transplanted every second year, they may be grown to the height of four or five feet before they are planted out permanently.

When planting out evergreens for a wind break, a single row will usually give the best satisfaction. If a double row is planted they should be set a long distance apart, otherwise the inside limbs will die off when they come in contact with each other. In planting a wind break do not seek to keep out the wind but only to break its force, or, in other words, sift it. All grain crops as well as fruit orchards require free circulation of air, otherwise fungus diseases, blight, fruit rot, etc., will injure them to a much greater extent. Scotch Pine, Norway Spruce and White Cedar make the best wind breaks. The pine should be planted about fifteen to twenty feet apart: spruce twelve to fifteen, and the cedar eight to ten.

In laying out grounds around the house plan to put the large trees in the back ground, at the rear of the house, and on either side of the lawn. If many trees are planted on the lawn in front of the house they should be small-growing varieties and few in number. If there is plenty of room one or two Cut Leaf Birch will not be out of place. There is a large number of evergreens suitable for ornamental planting. In addition to those already mentioned may be added the White, Austrian and Mungo Pines, Pyramidalis and Golden Arborvites, Silver Spruce and Hemlock. Among the newer sorts I would place the Colorada Blue Spruce at the head of the list of all evergreens as the most beautiful, especially when deep blue specimens are selected. *Abies Concolor* is perhaps next in point of beauty. The leaves or needles are longer and lighter in color than they are on the Blue Spruce, giving the tree a very soft feathery appearance. *Retinospora plomosa* and *filifera* are very pretty smaller growing evergreens.

Among the long list of decidious trees I would name the following as desirable: Maple, Sugar, Wiers Cut Leaf Weeping, Eagle Claw, Purple Leaf and Norway, Beech, Rivers Purple Cut Leaf and Weeping Beech, Golden Poplar, Cut Leaf Weeping Birch, Horse Chesnut, Salisburia or Maiden Hair tree, Purple Plum, Kentuck Coffee tree, Cut Leaf Alder, Mountain Ash and Basswood. American Elm and Chesnut shrubs can be used to good advantage in either groups, as borders or as single specimens. They should be well cultivated to get the best satisfaction from them. The following are hardy and among the most desirable: Roses, Deutzias, Double Flowering Almond, white and pink; Weigelas, Hydrangea, Grandiflora, Mock Orange, Lilacs, Tartarian, Honeysuckle, Spireas, and Altheas. The latter is not quite hardy in many places, but if a little protection is given during the first two or three winters they are not apt to be killed. They are among the prettiest of all flowering shrubs and will well repay the extra trouble required to get them started.

NEW MARKETS FOR OUR FRUITS.

By L. Woolverton, Grimsby, Ont.

With one consent the fruit growers of Ontario have come to the conclusion that their business is no longer profitable unless some new markets can be opened up for the disposal of their products. With commendable industry the N. D. F. G. Stock Company has been establishing agencies in every town for the better distribution of our fruit in our own Province; these towns we have surfeited with all kinds of fruit, and yet we have a surplus, and have to accept ruinous prices or else allow it to rot in our orchards. It is evident that we must go further and reach some portions of the world where the population is great enough to take our surplus without too much effecting the prices.

Such a country is our Great Britain, whose vast metropolis, the city of London, alone contains more inhabitants than the whole of Canada, and numerous other cities, each containing hundreds of thousands of inhabitants. This little sea-girt isle has the accumulated wealth of centuries, an over-flowing population, and land too limited in extent to furnish the food necessary for their subsistence, much less the luxuries. Though the temperature is usually higher than ours, the continued fogs from the gulf stream so obscure the sun that many of the finest fruits cannot be ripened out of doors. Grapes, for example, are grown under glass, and the finest varieties are very expensive, costing from 25c to 50c, and even more, per pound. Peaches can only be grown against walls exposed to the sun; they are pruned and trained flat against a stone wall or side of a house, to catch every sunbeam, and thus ripen this delicious fruit.

Under such circumstances is it any wonder if peaches bring almost fabulous prices in England, and if, therefore, we can once land our golden Crawfords and Elbertas in Liverpool markets in prime condition, we shall need no Klondike to furnish us gold? Pears are grown much the same as peaches, being often trained upon the wall to ripen. These fruits are brought over in large quantities from France, and bring excellent prices; but none of them, either peaches or pears, attain the rich gold and scarlet colorings of our Canadian, grown samples.

California is wide awake to this golden opportunity of money-making. First she flooded our eastern cities with her peaches and pears, until Toronto and Montreal are no longer open to our own fruit growers; and this done she is reaching over ahead of us to Great Britain. Indeed, for two years past, she has been pouring her fruit into Great Britain, via New York, at first with great losses but latterly with enormous profits.

Shall we, fruit growers of Ontario, allow these chances to slip away from us, and starve for want of a good market, when California growers, three thousand miles farther away, are growing fat by their enterprise?

Regarding other markets for our fruit, I notice the praise-worthy efforts on the part of N. D. F. G. Stock Co. to introduce our fruits into Manitoba and the North-west. No doubt the country is vast in extent, and one hundred years from now the population will be dense enough to consume a considerable quantity of our fruit. But now the whole population of Manitoba does not exceed that of Toronto, and probably one-half of these are so scattered over the prairies that our fruit could not reach them. A few car-loads, therefore, at any time will glut the market, and, counting the enormous freight rates, will bring the shipper sadly in debt.

The United States markets are closed to us, but we notice a sort of retributive justice in operation. During the past few seasons Canadian fruit has been finding favor in Hamburg, and it looks as if we were about to find an unlimited market in Germany, while late information seems to point toward the exclusion from that country of United States fresh fruit. Some recent shipments of United States apples were found to be infested with San Jose Scale, and were not allowed by the authorities to land at Hamburg: and not only that, but an edict was passed prohibiting the importation of United States fruit, except upon the most rigid inspection.

These ports are open to Canada, and, no doubt, will be, unless the scale infests our fruit also. What stronger argument can be brought to bear upon the Minister of Agriculture than this, to show the importance of legislation against the importation of American fruit and fruit trees into Canada?

We have just received a letter from a firm in Antwerp, Belgium, which shows that that country, too, is open for Canadian fruit, for it asks for regular consignments, giving, at the same time, the best of references.

Australia is also open for our choice Canadian apples leaving here in October and November so as to arrive before January, when their own summer apples are beginning to come into their markets. In a shipment of apples sent to Sydney three years ago, in bushel cases, I had cranberry pippins which sold at 15 shillings per case. All we want is proper cold storage and that market will be of great value to us.

It is encouraging to note that the Minister of Agriculture for the Dominion had decided to push the experimental fruit shipments to a successful issue during the past season, and thus relieve our fruit growers of the danger now threatening them from over-production.

THE PLANTING AND CARE OF THE ORCHARD.

By James O'Reilly, Hastings, Ont.

In giving my views on the proper way to begin an orchard, I do not desire to use a dictatorial tone, but merely to give my opinion as those of one who has for years taken a deep interest in fruit culture—of one who has read a good deal thereon, and had been a somewhat close observer of the results of his own experience.

There are a few important points to be observed in starting an orchard. First, the situation and soil; 2nd, the quality and variety of trees; 3rd, the planting, and 4th, the care thereafter.

It is evident that no after care can compensate for an unsuitable situation and soil, but I do not want you to suppose it so difficult to find a soil suitable to ensure a fair success. As an ideal situation, I would select a gentle slope to the west or south-west, but well sheltered from the west and south-west winds, a good clay loam soil, rich and well cultivated. But any land, whether sandy, loam or clay, will give good results if proper care is bestowed, but I would avoid a situation with a leachy sub-soil, or one holding stagnant water.

I do not intend to name particular varieties that I would select, but in a general way to designate the points to be aimed at. We want trees hardy, healthy and productive, or years hence we will be disappointed. We want to give them a good start, remembering that well begun is half done. No after care can entirely compensate for the neglect of the first year or two. I would like to impress upon you the necessity of good care bestowed upon an orchard the first year. Give the trees a good hold upon the soil, with proper plant food, and they will aid you in their care in the future. As for varieties, if we have no orchard at all, we need a few summer and fall apples for family use, but for general planting we want apples that will suit the market. At present, at least, we want to meet the requirements of the English market, viz., good shippers, long keepers and well colored fruit. Do not select light bearers, no matter what the quality of the fruit may be, nor apples that are small, if you can get larger ones equally good.

Now, as to planting. Do not get your trees nearer than thirty feet together—thirty-five is better. Lay out your plot regularly in rows, placing a stake where each tree is to be planted. If the soil is good and rich, no more trouble is required than to dig holes sufficiently large to take in the roots of the trees without crowding, spreading them out naturally as they grew.. If the sub-soil is poor or hard and near the surface, I have seen good results from digging larger and deeper holes than is needed and filling in with rich surface soil. And now notice a most important point, and one in which most farmers fail. *Cut back your trees well.* It is very hard to overdo this. I believe there is more failure in tree planting on account of failure to observe this point than from any other cause. Many persons cannot understand why the trees should be cut back. This is the reason : At the end of every little rootlet is a miniature sponge, and these sponges serve as so many mouths to absorb moisture and sustenance for the tree through which they pass to build it up, finally evaporating through the leaves what is not used in growth. In a healthy growing tree the roots and branches are properly balanced, but when the tree is taken out of the nursery many roots are broken, and it is necessary to restore the balance by removing the limbs. I never leave more than two or three branches, and cut these well back to the trunk, and cut off smoothly all broken roots. I do not set out my trees perpendicularly, but at an angle of forty five degrees towards the point from which the prevailing winds come, usually the north-west. After placing the roots naturally and filling in with good surface soil, we come to another important point. *Do not fail* to mulch your trees. Put a mulch of coarse but rich manure around the tree, keeping a space of three or four inches clear around the trunk. Stake your trees, fastening them with some soft substance, as a straw rope. Keep your ground planted and thoroughly cultivated, and keep all sprouts pinched off the trunk and branches, everywhere except where you want them. Care, now, will give you a tree just as you want it. It is much easier to prevent the formation of branches that will be in the way when the tree is large than to remove them with the saw afterwards. An hour or two spent going from tree to tree each week, removing worms, leaf rollers, plant lice, etc., will pay in the healthy, luxuriant growth of the trees. I would emphasize the necessity of cutting the trees well back, of mulching, and of cultivating the ground and caring for the trees, and if you have made a good selection of trees you have an investment that will repay you better than anything on the farm.

In addition to the apple orchard, every farm should have some plums, pears and small fruits, which would not only repay the cultivation but be a welcome luxury at the table. Many are deterred from planting an orchard through fear of failure, but with proper care there is no more reason to fear failure in fruit culture than in wheat or any other branch of agriculture ; and at $1 a barrel there is nothing on the farm that will pay better. There is no apple on the market to compare with the Canadian in quality, and it is our own fault if we do not avail ourselves of the advantage of soil and climate. The very severity of our climate is to our advantage in some respects, as the same variety of apples is much better flavored with us than to the south of the great lakes. If anything I have said will excite a greater interest in fruit culture, or clear up difficulties experienced by any brother farmer, I will consider my time in preparing this paper well spent.

THE CULTIVATION OF THE APPLE FROM THE SEED TO THE FRUIT.

By W. M. Robson, Lindsay, Ont.

The culture of fruit is a profitable industry and yearly yields a very large revenue in this country. But it has another and higher claim—that of exercising a beneficial influence upon the health, habits, and tastes of the people, thus making it of great national interest. The hope and future of this country depend on a happy, contented and prosperous majority whose staple product is derived from the soil. Let us then endeavor to take advantage of our privileges as cultivators of the soil and by united efforts raise our status.

Referring to my subject and commencing with the seed, which, from a commercial standpoint, seldom receives much consideration. It is mostly procured from the cider mills in the form of caked pomace. If for immediate use, it is broken up into small pieces preparatory to sowing. This should be done evenly, in drills four to six inches wide and two or three deep. The drills may be made from eighteen inches to three feet apart, according to the method of cultivation it is intended to follow. The best time to sow the seed is in the fall, and as soon as possible after the seed is got—say September or October—in ground previously prepared, in order to ensure a rapid and vigorous growth by next fall, when the stock will be one year old. The strongest and best may then be dug up and placed in a frost-proof cellar for the purpose of grafting during the winter or early spring. The weaker ones can be left over for another year's growth. The next thing is the selection of good healthy scions. This can be done in the fall, early winter, or whenever the wood is ripe, and always of the previous season's growth. This is very important. Great care will be required to keep the scions in a dormant but healthy condition. They should be placed in boxes and covered with damp soil or sawdust until time for use. The grafting process, called whip-grafting, is performed during winter or early spring in the following manner: The yearling seedling will be from one-quarter to three-eighth inches in diameter. The graft is always made at the collar, by the grafter making a clean slanting cut about one inch long from the root upwards, then cutting a little slit or tongue in the centre of this out. After cutting off a part of the tap root, or any other superfluous roots that may seem necessary, the stock will be ready for the scion, which should be four inches long with a healthy bud, one end cut slanting with a slit or tongue to correspond with or fit the one made in the stock. Both may now be neatly put together, forming a close contact with the inner and outer bark. The graft is then wrapped a few times round with a strip of cheap cotton previously saturated in liquid grafting wax, in order to bind and protect until growth commences. The cotton strips may be prepared previously and rolled up in ball fashion for convenience. A good grafting wax may be made as follows: Two pounds resin melted with one pound beeswax and one-half pound tallow. This completes the grafting process. The stock will now require to be properly labelled and packed away in moist soil, free from frost, until planting time. The method I have described is the one generally followed by nurserymen for the production of improved apples. The art is simple and easily acquired; success depends chiefly upon keeping the stock in a dormant condition before and after grafting until planting. The apple may also be propagated by bud, layer, or cutting.

Our next care will be to plant our grafted stock in the nursery rows, always supposing that the ground has been properly prepared the previous season, and is in good friable condition. A line may now be stretched and a trench or hole every eighteen inches opened with a spade, deep and wide enough to hold the roots without crowding. The grafted stock is put carefully in, the little fibrous roots adjusted and covered over with fine pulverized soil up to the graft, and the whole firmly trodden down. The nursery rows may be three or three and one-half feet apart. There is one thing just here that demands the closest attention. It is the correct naming of the different varieties. At each division or terminus of its kind, a strong stake should be driven in. If there is any danger of the label being lost or defaced by weather, a diagram of the whole plot may be prepared on a large sheet of paper, and the rows named and kept for reference. There is nothing so annoying to the orchardist, or to any person planting trees, as waiting patiently for three or four years in expectation of a certain kind of fruit and to be disappointed.

We will assume that our stock is now properly planted. For two years it will require good clean cultivation and attention to the forming of the head at a proper height (which ought to be from three to four feet high) by rubbing off the buds that have started up the stem. Young apple trees are sold out of nurseries at the age of two and three years. At that age they ought to be from five to seven feet high, if well grown and thrifty. My choice would be a three-year-old tree if raised in the immediate neighborhood ; if at a distance, two years old, for the reason that I think the younger tree would bear the shock of exposure and transit better.

We will now assume that the trees have attained their proper growth and age for permanent planting in the orchard. The choice of situation and soil is worthy of consideration. It is said that a southern or southwest aspect is not a favorable inclination for planting out an orchard, because in the spring vegetation starts earlier on this exposure, therefore more liable to be injured by frosts. But it is of much more importance to avoid a low or damp location. If possible, select high, dry land to plant an orchard on. Respecting soil, most undoubtedly the best results in apple-growing are got from a rich deep loam, porous and dry, with a clay subsoil sufficiently close to retain fertilizers or moisture during protracted droughts. But should the location from sheer necessity have a wet subsoil, then, previous to planting, it ought to be underdrained at regular distances from the proposed rows of trees. While it may be said of the apple that it is not fastidious about the soil it is planted in—as it will thrive in clay, sand, gravel, or loam—yet in any of them it will require cultivation and attention, such as pruning, and occasional washing or scrubbing with alkaline solutions (washing soda, soft soap, and emulsions of a similar kind) in order to destroy insect and fungous growth. It will now be necessary to decide on a definite plan as to the distance apart and the form of planting. There are two modes of planting—one where every tree is placed directly opposite another, or at right angles : the other where every tree stands in the angle of a triangle, or just midway from the adjoining row. This makes the centre tree an equal distance from six others, giving more space for the admission of light and air.

Before planting it will be proper and prudent to carefully select the varieties that are known to do well in the neighbourhood and are suitable to the different domestic purposes and profitable in the market ; commencing with the summer varieties, as all are anxious for the early apple. They are numerous in kind, but few suitable to this locality and not grown to any extent. I would only advise the planting of two,—Red Astrachan if the land is light ; Yellow Transparent in almost any soil. Fall and autumn varieties : First, the Duchess of Oldenburg, grown here and everywhere in Canada. It answers for summer and autumn equally well ; excellent for cooking and market. Fameuse, or Snow—a clean, well grown snow is one of the most desirable and profitable apples for home market. Wealthy,—an early and abundant bearer of large, beautiful fruit. St. Lawrence,—a beautiful dessert apple, very saleable. Alexandria,—a very large red or crimson apple that sells well on account of its size and beauty. Red Beitigheimer (new),—valuable and very large ; color, a purplish crimson. Many others can be profitably grown here. A good winter apple is the most desirable for market. The best, I think, in this locality, is the Northern Spy, for cooking and dessert purposes. Yellow Bellflower is a beautiful apple, good for culinary uses, very saleable. Ontario apple, comparatively new, is one of the best for all purposes ; tree a little tender as a standard ; does well grafted on hardy stock. Magog Red Streak,—tree very hardy and a profuse bearer ; fruit large, and keeps well. McIntosh red,—a handsome apple and an early beares; worthy of a trial. Besides these there are the Seek No Further, Wagoner, Golden Russet, Ben Davies, and many others.

In transplanting for permanency, the distance apart for standard trees ought not to be less than thirty feet each way, and some spreading growers would be better thirty-five or forty feet apart. In digging the holes for the trees it would be well to remember this

If the soil should not be as good as desired, this operation offers an excellent opportunity for supplying any defect by adding a composition of sand, loam, leaf mould, muck, or anything that would supply the want. In order to receive such, the hole would have to be dug much larger and deeper. Keep the fine surface soil for the roots. The tree may now be planted, slightly inclined to the west and north, the roots carefully spread out, and the whole firmly packed and tramped. This operation will be completed by putting a mulch round the tree of coarse litter of any kind to assist in retaining moisture during a hot, dry time in summer. The tree now, it may be said, has entered on its mission of wood and fruit growing. The majority of apple trees bear fruit in the course of four or five years after transplanting, and at the expiration of this time seventy-five per cent. will be bearing fruit.

THE FARMER'S GARDEN.

By J. W. Richardson, Caledonia, Ont.

Every farmer does not want to engage in fruit culture as a business, but every farmer should have a well stocked fruit and vegetable garden for home use. Its importance is not appreciated. A want of vegetables and fruits, each in their season, is a great lack. The farmer's table is often more scant of fruit and vegetables than the citizen's who buys at the market and pays cash. Few farmers will buy fruits for their table to any extent; he can live without it, and unless he grows it on his farm he goes without and his family must do the same.

Every farmer has a home market, at least to the extent of his own family—it is his best market and the easiest to supply; there is no competition, no freight, and no commission to come out of the proceeds. And yet many farmers say they have no time to attend to a garden. What would you think of a farmer who would buy milk, cream and butter from a neighbor, because he says he has not time to take care of cows, or one who says it is cheaper to buy pork and chickens than it is to raise them? There is more value in a good garden, in proportion to the time and expense required, than in cows, pigs or poultry. The farmer, by exercising due diligence, may have a full supply of fruits and vegetables the greater portion of the year, and of the very finest and best quality, which will do more to promote the health and comfort of a family, to say nothing of the pleasure to be enjoyed, than any other acre on the farm.

Many farm gardens are laid out in a small square plot surrounded by a fence, requiring all the work to be done by hand. Everything is planted in this small space, and in a short time bushes, vines and weeds become a general tangle, because the work in this garden has to be performed by hand, and many farmers come to the conclusion that it does not pay. The farmer has plenty of land. The garden should be laid out in shape; long and narrow, so that the most of the cultivation can be done with a horse. In commencing a garden, select a piece of land convenient to the farm house, on naturally well drained land—if not, it should be underdrained to give best results. No pains must be spared to have the ground in the best possible condition; it must be well drained and well manured, not a thin top-dressing, but heavily coated with good manure at the rate of thirty or forty loads to the acre. The first of September is a good time to lay out and prepare the ground for the garden, manure, plow and work down to a fine seed bed. In November ridge up in neat six foot ridges, which will leave the ground in good shape for spring planting. One portion of the garden may be entirely devoted to small fruits and the other portion to vegetables. We want a variety—a succession of small fruits and vegetables all the season.

We will begin with strawberries. Plant the strawberries in the spring on the four foot ridges prepared the fall before, by drawing a light furrow down the centre with the plow, which will greatly lessen the labor of planting. Select strong plants from vigorous runners. Plant about sixteen inches apart in the rows. The cultivator should be used often enough to destroy the weeds and keep the ground mellow. Its use would naturally draw the runners to the centre of the bed, so that a full matted row may be obtained by fall. Varieties—Wilson and Williams. Three rows would be sufficient, one row planted every year.

Raspberries and blackberries should be planted on the six foot ridges from two to three feet apart in the row. The black cap varieties are multiplied by the rooting of the tips of the canes and the others by suckers, which will come up during the summer. The best plan in cultivating is to nip off the tops when about two and a half or three feet high. This causes them to grow stocky and to throw out side branches, and will in this way produce better than if allowed to grow up and spread over between the rows. After the fruit has been gathered, the canes that bore fruit should be cut off at the ground and destroyed, also any weak shoots of the new growth, leaving only a sufficient number to have a good crop the following season. Would select one row each, Cuthbert, Shaffer's Colossal and Greg.

Currants and gooseberries should be planted in rows, the same as raspberries, but farther apart, say five feet. The following varieties have succeeded well in our garden: Gooseberries—Smith's Improved and Downing. Currants—Red Dutch, Red Cherry, while the Black Naples is the most desirable of the black currants, being equal to any of them in flavor, nearly in size, and yields the largest crops. They should receive a little pruning to remove the old wood that has borne three crops of fruit, also any weak or surplus shoots. Attention should be given to keep the caterpillars in check on the red currants and gooseberries by a timely application of hellebore.

The grape should have a place in the garden; being a perfect food it is one of the most wholesome articles of diet. Set the vines eight to ten feet apart in rows Train upon a trellis, fan shape, posts being set about twelve feet apart, with wire attached. Trim in fall or early spring, cutting the branches of the main canes back two or three buds. The Concord is the best all round grape, while the Delaware does well on clay soils.

Rhubarb, being one of the earliest vegetables, is indispensable to the family. Planted in a properly prepared bed, it will yield a crop for years. To produce large crisp stocks it should be covered two or three inches thick with good stable manure, after the ground freezes in the fall.

As soon as the vegetable portion of the garden is sufficiently dry in spring to admit being worked, prepare a fine seed bed. Plant everything on the level, such as onions, radishes, beets, parsnips, carrots, lettuce, peas, etc., and continue during the planting season until a sufficient variety of vegetables have been planted in rows twenty inches apart or wide enough to admit your narrowest cultivator. Other vegetables, such as tomatoes, melons, citrons and cucumbers, should be planted in wider spaces. Do not cultivate too deep, try and keep about the same depth. The roots of the growing plants will not then be injured. Some experience is required to make the garden a success—there may be failures in the first attempt; these failures may give you the knowledge required in the future. With everything so arranged that the horse scuffler may be used to the greatest possible extent, hand-hoeing is diminished and growth is promoted in proportion to the frequency and thoroughness with which the cultivator is used. The farmer's garden, if properly laid out and well managed, will do much to promote the health and comfort of a family and will also provide considerable pleasure. Get the boys and girls once interested in the care of a berry patch, let them have a good supply for one year, and they will not be likely to ever forget the luxury. The fruit and vegetable garden will lessen the cost of living one-third, your doctor bills will decrease, your health increase, and as the years pass by you will wonder how you ever got along without a good garden.

PLUM CULTURE.

By John M. McAinsh, Wellburn, Ont.

I will treat this subject in two parts: 1st, the soil and cultivation, 2nd, the best varieties.

The best soil for the plum is one ranging from a clay loam to heavy clay, and to give the best results it should be thoroughly underdrained. A light sandy soil is much inferior to a good clay soil. It will be seen from this that this section of country is well adapted to the cultivation of the plum. Good cultivation is required, and the ground should be well enriched with manure. As a special fertilizer, half a peck of salt scattered around each large-sized bearing tree once every two years will be found to be of great benefit. Plum trees planted in poor soil and neglected will never amount to much

The plum has two enemies which must be carefully watched and combated, the black knot and the curculio. The best remedy for the black knot is to give the trees good cultivation and to cut away any knots as soon as they make their appearance. Neglected plum trees are far more liable to be attacked by black knot than those which by good cultivation are kept growing vigorously. As the plum tree is short-lived when it begins to show signs of decay it is best to cut it down and plant again. The curculio is easily kept in check by spraying. It will also be found very effective to have the plum orchard enclosed and allow hogs to run at large in it.

Out of a large number of good varieties which can be successfully grown here it is somewhat difficult to select a few, say half a dozen, varieties as being the best. However, I will name a few which will be, perhaps, as good a selection as any. I presume, however, that there are other varieties which, in the estimation of others, are quite equal or perhaps superior to those named. *Lombard.*—This variety stands in the front rank for profit. The tree is hardy, a vigorous grower, an early and abundant bearer and the fruit is of excellent quality. Although it is more liable to become affected with black knot than some other varieties, yet in spite of this drawback those who grow plums extensively consider that there is more money in it than in any other variety. *Pond's Seedling.*—This variety is even more hardy than the Lombard, although it is not so vigorous a grower, and, though it is not entirely exempt, it is less liable to the black knot. It is an early and productive variety, but in this respect it cannot compare with the Lombard. The fruit is of large size and of good quality. *Imperial Gage.*—This is in every way an excellent variety, the fruit being of good size and quality, and the tree is a good grower. However, it will succeed better if it is top-grafted on some hardy stock, such as the Lombard. *Washington.*—This variety is a good grower and fairly productive, and as the fruit is of large size and good quality, it is every way worthy of cultivation. *Glass Seedling.*—This variety is not suitable for dessert, but is excellent for preserving purposes. The tree is healthy and hardy, the fruit is of large size and of handsome appearance. It requires to be planted close to some other self-fertilizing variety in order to ensure a good crop. *Coe's Golden Drop.*—This is an excellent variety, and is recommended to those who want a good late-ripening plum. *Green Gage.*—Those who want a plum of the finest flavor for dessert purposes cannot do better than to plant the old Green Gage. The fruit is rather small but of the finest excellence, and the tree is productive and hardy. However, as the tree is rather a slow grower, it succeeds best when it is top-grafted on some strong growing variety. *Jefferson.*—To those who want a plum combining large size, handsome appearance and excellent quality I would name the Jefferson. Like the Green Gage the tree is rather a poor grower and succeeds best when it is top-grafted. *Saunders.*—Inquiry is often made as to plum trees free from black knot. I know of only one variety which has proved to be entirely free from this pest. That one variety is the Saunders. Besides being free from black knot it ripens its fruit about two weeks before the plum season. But, against those advantages, it is rather a poor grower, and the fruit although ranking as "good" is, in size and quality, inferior to a good many other varieties. To give the best results it ought to be top-grafted on some hardy strong growing variety.

THE CULTIVATION OF THE STRAWBERRY.

By W. L. Dixon, Dromore, Ont.

In 1889 a bulletin on strawberries was issued by Mr. W. W. Hillborn, horticulturist of the Central Experimental Farm. This bulletin showed that to raise strawberries required no better land and no more labor than to produce a crop of potatoes. It is because people do not know how to work to the best advantage that they think they have no time to raise this useful and delicious fruit. I will venture to assert that many employ their time on the farm at work that gives much smaller returns than a well kept strawberry bed. This part of the country may never rank high in producing strawberries for market, because the growers south of us supply the market before ours are ripe, but for home use or to supply any local demand that may exist, the time spent on a strawberry patch will certainly pay well. I began by setting out a row about 200 yards long from old plants that had been on the farm many years, and were an excellent variety, but for want of cultivation were unfruitful. Here I may remark that some plants should be set out every spring to produce young plants for the next year's plantation, for only plants of the previous year's growth give the best results. By the old method of setting out plants it took three or four days to finish my 200 yards. Now I can, with the aid of a boy, set out 600 yards in one day by the new method of planting. This newer and better method saves much time and is described in bulletins on this subject issued since 1889, from both Guelph and Ottawa. These bulletins can be had free by any one applying for them.

Planting. Use a good strong trowel in planting. Put it into the earth to a depth of about five inches, move to the left, leaving a hole with a perpendicular side on the right. Against this place the roots of the plant, spread out fan shaped. Set the plant to the same depth as it stood before raising. Fill in earth with trowel against the left side of roots, and after several have been set, press the earth firmly with a foot on each side of plant. This excludes the air and ensures growth. The results from my first row were such that I set out some new plants each succeeding spring with varying success. Last summer I had 1,000 boxes from plants set out in less than two days. Some of the plants were 14 months old and some 26 months old when the fruit was picked. I never take more than two crops from the same plants, because keeping down weeds and renewing beds takes more work than setting out new ones.

Soil. The soil I prefer is one with an open bottom that will admit the air and not hold the water. My plot has a sandy subsoil. When the subsoil holds water I think the plants will be liable to heave with the frost.

Preparation. To prepare the ground, manure heavily a year before the strawberries are to be planted. Plow deep and if the soil has not a sandy or gravelly bottom a subsoil plow should follow the common plow ; plant with potatoes ; cultivate well during the summer to kill all weeds ; plough deep after the potato crop has been harvested ; and just before the winter sets in set up in drills such as we make for turnips. This helps the water to run off, gives the frost a better chance to pulverize the soil, and makes the ground dry off earlier in the spring. As soon as the ground is dry enough for a team to walk on it, cultivate thoroughly and as deep as possible. This is much better than ploughing it and turning it over. If the weather is at all favorable the ground will then dry off for planting in a day or two at most. Next harrow, and, after making it as level as possible and throwing off stones, hard clods of earth, etc., run the roller over it. This will make the plot smooth for planting. Set out the rows north and south by means of three stakes and a garden line. Mark the ground by the line and then move it on till the whole plot has been marked before beginning to plant, as it is easy to see the marks after the ground has been rolled. The rows should be four feet apart and the plants 15 inches apart in the row.

Time. I generally finish planting before the end of April. Some have asked me if it would not be better to plant in the fall. My experience goes to show that spring planting is very much preferable: (1) You get a good crop of fruit in 14 months after planting. (2) You have not so much weeding to do. (3) Plants rarely die when properly planted early in the spring.

Situation and Shape. A strawberry plot should be at least 50 yards long, and it should be in a field that the scuffler may be used in keeping it clear of weeds, and that it may be out of the reach of fowl. Also if we would escape the summer frosts that often visit us in this locality about the blossoming time, we should choose a situation for our plot higher than the surrounding surface, so that the cold air which is heavier may roll off to the lower lands and not freeze the blossoms or the plants. In this respect I had two partial failures by having my plot on low land. Two years ago last spring the frost was so severe as to ruin our hay crop; not much wonder then that the strawberry plants were frozen down—at least the earliest and tenderest plants were thus frozen. The blossoms and fruit appeared later even on the frozen plants, but the plants were so weakened and diminished by the frost that the sun dried up the fruit when half grown, and it hung on the vines like dried grapes or currants. A year ago last spring the frost came when the blossoms were out and a finer show of blossoms could not be seen than that destroyed by the frost. The only plants escaping were the young plants of the previous year's setting; these being a little later than the others, escaped the frost. This shows another reason for setting out a new plot every spring.

Strawberries may be raised on the same ground for many years in succession if well manured. I think the best way to do this is to divide the bed into three parts, ploughing up one-third of it each year after the crop is off, manuring well and ploughing again before winter, and finally drilling up the ground as said before. I have been trying the experiment of green manure by sowing peas as soon as the crop of strawberries are gathered and the plants ploughed in. These peas are ploughed in in September. Green manure and commercial fertilizers have the advantage in one respect—they contain no seeds to grow up into weeds to trouble us the next year. By planting one-third of our plot each spring we never take more than two crops off the same plants.

Care of New Beds. The way to take care of a new bed is to keep it clean by going over it about once a week with a hoe or rake to kill the weeds that are just starting near the plants, and also to form near the plants a sort of natural mulch to prevent the escape of moisture. A scuffler should be passed between the rows without coming near enough to disturb the plants. It requires no more work to hoe the plot eight or ten times at proper intervals than to go over it once about the middle of July when the plants are nearly smothered with weeds. In the first instance your plants will be vigorous, in the second they will be stunted and delicate, having been robbed of their moisture and nourishment, and sunlight and air, till on suddenly removing the great crop of weeds, many of them may die and all will be injured for life, and will be fit only for a hospital for sick plants. Another thing that sickens strawberry plants is allowing them to bear blossoms and fruit the first summer. Those who do so are "Penny wise and pound foolish." Runners, too, should be removed till the middle of July, otherwise the plants will exhaust themselves starting runners before they have become firmly rooted in the soil. Plants properly cared for will in a favorable season so cover the ground with runners before winter that it will be necessary to hoe a track through between the rows. I had them this way two or three years, but last spring was so wet that the ground became sodden and heavy, and the runners were not numerous. Also a grub or cut worm worked havoc among my plants after they were two or three months planted. I wrote about this matter to H. L. Hutt, Esq., of O. A. C., and in reply he says: "If the strawberry bed follows in rotation a well-kept potato patch or some other hoed crop there should be little or no damage to young plants from cut worms." He also advocates a top dressing of plenty of wood ashes applied early in the spring.

Varieties. Some of the best varieties of strawberries I have tried are the Sharpless, Wilson, Haverland, Woolverton, Giant, and another variety that has been on the farm as long as I can remember. Of this latter variety I sent a dozen plants to O. A. C., Guelph, and in total weight of fruit produced it ranked 14th out of about 150 varieties there tested. Some varieties succeed in some localities while they do not come up to expectations under other conditions of soil and climate. In the last bulletin on strawberries issued from Ottawa, it is stated that the Woolverton variety "Produces few runners." I am at present experimenting with it and three other varieties received from Mr. Hutt, of O. A. C, and I find that it is one of the most vigorous growers I ever saw. Again, of another variety, reported from Guelph as being rather soft, I have found the firmest berry I grew. It is hardly fair to judge a variety by one year's trial.

Cautions. (1) Strawberry blossoms are divided into two classes—perfect and imperfect; therefore perfect varieties should be set out if only one kind is grown. Imperfect should be grown with one-quarter their number of perfect, or no fruit will be produced. When properly fertilized, imperfect produce the largest crop. Hence the danger of selecting one of the best producers and getting no fruit. When both classes are planted together, both should be early or both late varieties, or the perfect flowering sort will fail to fertilize the blossoms of the imperfect.

(2) Plants should not be exposed to the sun or wind while out of the ground or they will be much injured.

(3) Cover the plot at beginning of winter with coarse manure, cut straw, dead leaves or saw-dust, to prevent heaving from alternate freezing or thawing. However on light land, particularly where the snow fall is heavy, mulching is not required.

(4) Continued dry weather when the fruit is growing and ripening may very much diminish the size and quantity of the crop, but this may be provided for by a simple system of irrigation. Where a person cannot have a water supply on the ground, with a windmill, and tank and hose, etc., to spray the plot, he can at any rate get two coal oil barrels, connect them to a nozzle with a piece of gas pipe, and mount them on two wheels. Thus he may use horse power to water the strawberry plants and other garden vegetables with much advantage and profit. Some, however, prefer shallow but frequent cultivation between the rows during the fruiting season if the weather is dry. This keeps the moisture from escaping, but may soil the fruit to some extent.

POULTRY DEPARTMENT.

POULTRY POINTERS FOR THE FARMER.

By Robert H. Essex, Toronto, Ont.

The Canadian farmer hardly realizes that his farm is the greatest source of supply of eggs and poultry in this country. He knows that his wife gathers periodically a number of eggs from the hens that run around and lay, here, there and everywhere: and that he obtains a few cents a dozen for them when he has occasion to attend the market town. As for going to market solely to dispose of his eggs and poultry, nothing is further from his mind, simply because he does not realize the importance of the industry.

Who, among the farmers, obtains the highest price for his cattle? Is it he who lets them run at random over the sidelines, and who throws out their fodder, and waters them just when he happens to think of it, and who, finally, drives them over a rough road to market when he has other business in town? "That's absurd!" you exclaim. So it is, and yet you allow your hens to ramble around and take chances of getting food and water, until you happen to pass the corn bin, and then you throw them enough for a dozen meals, and expect them to lay an abundance of eggs. That's absurd also. "Oh! poultry's a small thing anyway." Is it? Would you not study the market for barley, or wheat? Even if you had only a small amount to sell, would you not aim to get the top price for that small quantity. Of course you would. Then why not do similarly with your poultry and eggs? Your fowls aggravate you I know. They commence to lay in spring when prices are going down, and they lay and cackle, and cackle and lay, all the summer, when you are offered from seven to ten cents a dozen for eggs. There are several reasons for this aggravating behaviour. Would you get good crops if you sow your seeds a month or two later than usual ? No. Then why expect to get good layers if you hatch your birds a month or two later than you should ? Wheat takes time to grow, so do chicks. Hundreds and thousands of chicks die every fall by reason of exposure to cold rain, while they are yet two young to withstand it, and those that survive are the birds that aggravate you by commencing to lay late in the spring. They were hatched too late. Get your chickens out in March, April and May if you want winter layers, and do not let your hens use their own sweet will and increase in June and July, thereby supplying you with a lot of discontented youngsters in the fall.

Feed your young chicks frequently and sparingly. Yet I wish you to understand it is better to have good fresh food before them all the time, rather than to gorge their little crops two or three times a day. If the food is always there, they will take a little perhaps fifty times a day, and then go in search of an insect, or water ; so all the time their crops contains a little food, which easily digests, instead of having full crops, necessitating lying around to sleep it off, and promoting indigestion. Feed very little soft food or mash. Have grit or gravel before them all the time, and don't let the feed be too fattening. Give lots of oats to growing chickens after the first three months, especially if they are early hatched, so that they will obtain size instead of maturing quickly. If they are hatched late in May or June hurry them along with wheat and cut bone, or a substitute therefor.

The idea is to get your pullets to lay in November before the severe winter sets in. It is easy to keep them laying if they once make a start, but it is difficult to coax them to commence in winter ; they like to put it off until spring.

Have your house ready in November—I mean, see that it is warm, free from cracks in the walls and windows. The warmer you can make it the better. If you cannot build the whole house so as to keep it warm, fix up one corner of it for a roosting place and have that portion comfortable. Supply lots of light and room to scratch inside during severe weather. Don't change your nests, or the surroundings, after the hens have commenced laying. The slightest change effects them, and you will notice a reduction in egg production.

Bear these things in mind.

Don't crowd your fowl during the day. A dozen hens with lots of floor space will lay as many eggs as two dozen crowded.

Keep them free from lice by coaloiling the roosts, and see that the fowl have a sunny corner to dust in.

Clean the droppings at least once a week. You will save lots of work if you have a droppings board.

Feed them regularly. Very little mash in the morning. Scatter food sparingly during the day, in litter. Fill their crops at night. Supply all the water they will drink.

In marketing your eggs, use a proper egg carrier. The eggs will be worth at least a cent or two a dozen more than if shaken together in a basket. You will be tempted to sell your eggs away into the spring if prices are good. Don't do it. Set them yourself ; it will pay you better after the first of March to do this.

Do you know that a chick hatched in March will bring you more money in June, than it will with its increased weight in November ? Many farmers say the chicks are not big enough for market until the fall, and they cost so little to keep, That is a great mistake. A chick weighing two pounds in June is worth over fifty cents. The same bird weighing five pound in November is worth less than fifty cents. Subscribe to a first-class poultry journal, which can be obtained for fifty cents or one dollar per annum, and will tell you all you wish to know about poultry. Attend every meeting where poultry topics are discussed, and carry out good advice thoroughly, not thinking " Oh this will do just as well." It won't.

PRACTICAL POULTRY-KEEPING.

By A. G. Gilbert, Central Experimental Farm, Ottawa, Ont

I start with the presumption that the farmers want to make money and as quickly as possible. Poultry, properly managed and fed, gives a quick return and a handsome margin of profit. In making this statement I am at once met by the remark, "Oh! you say so because your bread and butter is at stake." Well let me relate the following, taken from *Wallace's Farmer*, a paper published in the United States; "A friend who was visiting a farmer noticed that after cleaning the dairy building and utensils the farmer's man next gave attention to the poultry building which he attended to with equal care.

"Why do you take so much trouble with your poultry house? I noticed that your man gave it the same careful attention as he did to the dairy," remarked the friend.

"I will tell you why," replied the farmer, "I make 100 per cent. profit out of my poultry as compared with ten per cent. from other departments of the farm."

How to do Likewise. At once I am met with the exclamation, "How can I do likewise"? Allow me to reply that we have found the following methods work well at the Experimental Farm, and by observing them a farmer, his wife or his daughters will make the poultry on the farm pay—if not 100 per cent.—at any rate a satisfactory margin of profit, until the necessary experience has been gained to permit of attaining to the higher figure.

First—Select Plymouth Rocks or Wyandottes for eggs and flesh. For eggs alone, Leghorns, Minorcas or Andalusians. Keep no bird over two years, except in the case of a rare good layer of large eggs from which you wish to breed, in order to perpetuate the strain. In mating see that the male bird also comes from a large egg-laying strain of fowls.

Second—Have your house modern in construction, with litter at all times on the floor. Let part of the furnishing be, without fail, a narrow trough 2½ inches in width, to be nailed to the side of the pen; a small box to hold grit and lime and a dust bath.

Third—For winter morning ration, feed three or four days of the week, cut raw or green bones. If green bones cannot be conveniently had, break up beef, or sheep heads, but give meat in some shape. Other mornings of the week feed a warm mash, composed of ground grains into which mix steamed clover hay or lawn clippings; vary by using small potatoes, turnips. etc. Feed the cut bone or broken heads in proportion of one pound to every fifteen hens. Give the mash in a "crumbly" (not sloppy) condition in proportion of one quart to every twenty hens. Feed mash and cut bone in the narrow trough. On no account throw either in the litter on the floor. After morning ration throw a handful or two of grain in the litter on the floor and start the hens exercising and *keep them at it all day*, if possible. Experience has proved that much of the non-success in obtaining a regular supply of eggs in the winter may be traced to the over-feeding of the morning ration. If the hens are "gorged" at that meal, they will not be inclined to exercise, and it must be borne in mind that exercise is one of the principal factors in the winter production of eggs. Give no noon ration, but have mangels, turnips, or some other roots, before the layers all the time. Mangels will be found the cheapest. Cabbage is good where it is plentiful and cheap. For afternoon ration give buckwheat or wheat or oats mixed with buckwheat. Feed liberally and early enough to permit of the fowls searching for the grain in the litter. All grain should be thrown into the litter on the floor so as to induce activity. Pullets will require more generous treatment than hens. Judgment must be used. Pure water, grit and lime should be in regular supply.

Fourth—Aim at converting as much as possible of the waste of the farm into money in the shape of eggs in winter and later on into poultry when eggs are beginning to drop to a low figure. The kitchen and table waste, vegetable peelings, etc., may be all utilized in the composition of the mash.

Fifth—Having obtained the egg, sell in the best market or to the best possible advantage. Some farmers are nearer to good markets than others. It is an object to the farmer, who has to be content with low prices, to reduce the cost of production as much as possible.

Sixth—Keep strict account of cost of production and receipts.

Seventh—Keep an eye on your fowls and mark the best layers. If possible breed from them and you will so secure a strain of prolific layers. For setting select the eggs of perfect shape and large in size. Do not mistake a mal-formed or egg of double yoke for a large one.

ENERGY NECESSARY. Do not say that the carrying out of the foregoing entails trouble and time. Paying results cannot be obtained from any department of the farm without energy, perseverance and intelligent manipulation. Every farmer knows that. I have spoken principally of the obtaining of eggs in the winter season. In summer there should also be a margin of profit for strictly new laid eggs, clean and inviting in appearance, and put into the hands of the consumer with the flavor intact. I shall be happy to forward to any one who wishes it, a copy of my evidence before Committe of Agriculture of House of Commons wherein is shown the cost of feeding, the manner of managing and the profit made out of fifty hens for one year. The pamphlet may be had free of cost. It might be an aid to some ; an incentive to others.

THE OVER-PRODUCTION BUGBEAR. I have no fear of over-production in winter, for the reason that the feeding of fowls in winter, in the colder portions of the Dominion, so as to obtain eggs from them in paying quantities, requires skilful management which can only be gotten by experience. In other words it is one of the "Exact Sciences," and for that reason there will always be plenty of room at the top. The situation seems to be as follows : Where the layers have to be kept (as ours are) in limited winter quarters from December to the following April, artifically housed and fed in the meantime, the producing of eggs is attended with such difficulty and expense as to make them comparatively scarce and high in price in consequence. Where the winters are mild and the layers can run out eggs are easier to obtain and more plentiful, and as a result cheaper in price.

Eggs have gone, in the past two or three winters, from the milder west to the eastern markets of the colder regions, in no small quantity and with profit to the shippers. But whether eggs are produced in the eastern or western portions of this country there should be, with proper management, a satisfactory margin of profit.

RAISING POULTRY ARTIFICIALLY.

BY W. R. GRAHAM, BELLEVILLE, ONT.

Perhaps no branch of the poultry business is more interesting than the rearing of chickens artificially. Some have grave doubts as to its practicability, others have tried and failed, and a few have succeeded. When chickens are to be raised in any quantity, say from 75 upwards, the incubator and brooder are very useful. True, they do not hatch as well as our best hen which brings out thirteen chickens from thirteen eggs, but when taking the average of 200 eggs assigned to hens and the same number given to an incubator, we have found the machine superior to the hens, not only in the percentage hatched but also in the amount of time required to take care of the eggs during incubation. That incubators and brooders require careful attention (even the best regulated) cannot be denied. If one intends to visit the machine once a day or at any time when there is leisure, the sooner the incubator is set aside the better it will be for the owner's finances. Incubators should be so constructed as to be comparatively fireproof and airtight—that is to say double cased—in order that a change of temperature outside the machine may not materially affect the inside temperature. It should be self-regulating, so that upon once reaching the proper temperature, 102 degrees F., it can be relied upon to stay there for at least twelve hours. It should be well ventilated—eggs must have *pure fresh air.* This is a very important fact and a point very favorable for turning the eggs twice daily outside the machine. Never leave the machine door open while turning the eggs, as the temperature falls both inside the machine and in the eggs, and it may be hours before the eggs are brought back to the proper temperature.

Good brooders are as essential as good incubators. Hens can be taught to take charge of the chicks hatched in machines, but are not very satisfactory. Vermin are scarce when chicks are reared artificially, as they have no old mother from which to get them. If the brooders are kept clean no vermin will be found, which is a great advantage not only in rapid growth but also much to the comfort of the pickers when dry picking is to be done. We use hot water brooders in preference to hot air, as in case a lamp goes out from any cause the temperature is maintained for a time afterwards. Brooders should be so built as to be easily cleaned, well ventilated and proof against fire and all vermin, such as rats, etc. They should also be roomy. The temperature of brooders should be kept at a little above 100 degrees. They should be carefully heated and run for a day or two previous to putting the chicks in. Always bear in mind that every fifteen chicks put in the brooders raises the temperature one degree. If you do not allow for this you certainly will roast the chicks alive.

Much has been said about what young chicks should be fed. Feed rolled oats dry on a clean board—a board twelve inches wide and three feet long will be feed room enough for 100 chicks. Keep the oats before them constantly for three days, then feed every two hours all they will eat up *clean and no more*; if any is left take it up. Feed regularly. After the first week a change may be given for part of the feed: a mixture of stale eggs, milk, cornmeal, bran, and a small quantity of animal meal; season with a little salt and pepper and bake in the form of a cake; crumble and feed dry. Never allow feed to sour. This can gradually be changed to a mixture of ground oats, corn and bran; scald and feed while fresh. When about ten days old, scatter small wheat or millet seed in a short litter so as to induce the chicks to scratch. Plenty of outdoor exercise is very necessary and is also a good tonic. When about eight weeks old give two feeds a day of soft food and one of whole grain—the latter given in the evening. Gradually reduce the number of feeds per day until three are reached.

Plenty of fresh, pure water should always be within easy access. A cheap fountain can be made by taking an ordinary tomato or corn can and punching a few holes near the mouth edge; then fill with water, and place a saucer on top and quickly turn both over, holding the saucer tightly to the case and you will have a first-class fountain for your chicks. They cannot upset it easily and cannot get wet feet or bodies. Feed yellow corn in preference to white, as it has a tendency to give a deep yellowish tinge to the skin, adding to the appearance when dressed for market.

Birds intended for market should be confined in a small yard, with shade and shelter attached. About ten days before killing feed all they will eat, principally corn with a little meat. Fast eighteen hours before killing. Always pick dry, as the dry picked fowls sell much more readily than scalded stock. Killing and picking may be accomplished in the following manner: Place the body of the fowl between your knees, then with the left hand open the mouth and with your right cut a deep incision in the roof of the mouth immediately below the eyes, after which cut the juglar vein, this insures perfect bleeding. Commence picking *at once* by placing the wing tightly between the knees and pulling the feathers opposite to the way they lay naturally. Leave one-half the feathers on the neck and a few on the wing tips. Pick as quickly as possible. When done wash all the blood from the head.

If the weather is warm place in ice water until thoroughly chilled, then pack in barrels or boxes and they will stand a journey of eighteen hours with safety. When packing in barrels place heads downwards, keeping the bodies close together, put a layer of ice around the edge of the barrels and between each layer of fowls.

A few points might be mentioned:

1. Usually deep yellow-fleshed fowls sell in preference to white-fleshed ones.
2. Breed only from strong, healthy, well-built stock.
3. Yellow or white eggs should be bred, not a mixture of the two. Always breed for the size of the eggs; small eggs are not in demand.
4. Pullets intended for layers should be separated from the cockerels when about nine or ten weeks old.
5. Hens over two years of age usually do not lay as many eggs as younger ones.
6. Eggs set before March 1st usually are not as fertile as later ones, and the percentage hatched increases with the percentage of fertility.

PRACTICAL POULTRY-KEEPING.

By C. W. Young, Cornwall, Ont.

I feel somewhat more confidence in talking to an audience of farmers on the subject of poultry keeping than I should two or three years ago, because I am satisfied that more of them are beginning to look upon it as a serious part of the farm economy, and not merely a side issue to be left to the women and children. A gentleman at Apple Hill told me the other day that he had sold material for one hundred hen-houses last year—mostly in Lochiel and Kenyon—and the prospects were that there would be more the present year. The people who build these houses are going to look after their fowls and treat them as money-makers, giving them the care their importance demands. The prime requisites for the successful keeping of live stock of any kind, whether cows or hens, or any other creature, are food and shelter. If you stable your cows outdoors, or in draughty sheds, and let them get their food where and how they can, you cannot depend on them for much milk, nor can you expect hens to lay under such circumstances. I venture the assertion confidently that it takes a smarter man to make hens lay in winter than to make cows give a good flow of milk at the same season.

First of all, for the production of winter eggs a warm house is needed. I do not mean that it must be artificially heated, though that would be better, but it should be so warm that in the coldest weather water will freeze only a little, not go solid in the pail. I have accomplished this in an ordinary barn, and am satisfied I could build a house entirely frost-proof. For a farm hen-house I would advise that it be built on the south side of the cow stable, and opening on to that apartment, if possible, with a wire netting between, to keep the cows and the hens apart, for it is not advisable they should be together. The heat from the cows will make the hen house as warm as necessary. There should be plenty of light; a sash made double is better than a double window, and it will be found a benefit to have a curtain to draw over the window at night to prevent the cold striking in. If the house is built with the floor a few feet above the ground, and a sub-story for the hens to scratch in, it will be better; but if not, have a dust bath two or three feet wide under the window; the sun will warm the earth and make it more inviting for the fowls to wallow in. The hen-house should be divided into separate pens for about twenty-five hens, giving about six square feet for each; and while you are at it, make one or two pens for male birds by double-decking a part of the house with wire netting front. These pens should be about three feet deep, two or three feet high, and as wide as the pen itself. This arrangement makes it easy to feed and care for the male birds, which should always be kept away from the females, except when the eggs are needed for breeding purposes. Have a passage-way about three feet wide in front of the pens, and if room is an object place your trough for soft feed about six inches from the floor, and nest boxes above that, and the roosting place above that again. The soft feed is put in the trough, the eggs gathered, and the roosts cleaned from the passage, thus avoiding disturbance of the hens, which are as susceptible to annoyance of this kind as are milking cows. The floor should be of wood,—it is impossible to keep earth floors dry—and kept well covered with litter, old straw, leaves, chaff, or any light material into which the grain is thrown to make the hens work for what they get. No scratch, no feed, is a cardinal principle in poultry keeping. The hen-house should not be any higher than sufficient to allow a man to stand upright; the higher—the colder, as a rule. In building a house it is well to have a definite idea of what you want. Prof. Gilbert has given a good one in his last report; an excellent one is given in *Farm Poultry*, Boston, and there are others which you can trim to suit your taste

Having housed your fowls comfortably and carefully, you must feed them carefully or you will get no eggs. A mash of vegetables, well boiled and thickened with bran or provender, is an ideal morning ration, in the proportion of a quart to fifteen fowls. In town we use the kitchen wastes for this purpose. A handful of grain or millet seed thrown in the litter will keep the hens busy most of the day. Hang up a mangel, or a cabbage, or a turnip, and give meat in some shape,—cut green bones, liver, or whatever you have—two or three times a week, but meat they must have in some shape. Mrs. Yuill's plan of boiling the offal at hog-killing time, thickening the stew with provender, putting it into barrels to freeze, knock out a stave or two and let the fowls get at it as they can, seems about as easy a plan as a farmer can adopt to solve the meat question. I have found oats the most satisfactory food for fowls all the year round, with a little wheat or buckwheat for a change, but corn not oftener than once a week at the evening meal, especially for the heavy breeds, which will soon get fat and lazy on a corn diet. The proper allowance of grain is about a quart for ten hens.

If you have hatched your pullets early, not later than the middle of May, they should begin to lay about the middle of October, and if taken good care of you will have eggs in November, December and January, when they are worth the most money. I have never had any difficulty in getting thirty cents a dozen for my eggs at that season, and by establishing confidence with a city dealer higher prices may be had. None but large eggs should be shipped; they should be clean and unfertilized, then there is no chance of any bad ones. At the rate I have mentioned, or a good deal less, there is a substantial profit. I buy everything I feed, and figure that my eggs cost me six cents. a dozen the year round. A farmer should raise them for less. I have an abiding faith in the hen as a wealth-producer, and look forward to the time within a very few years when she will be treated with the respect and attention she deserves, and add very materially to our national wealth.

GENERAL CARE OF POULTRY.

By G. F. Hayward, Lakefield, Ont.

When a man intends going into the poultry business the first thing to provide is suitable quarters for his stock. The building, if possible, should face the south, and should be built about six feet high in front and eight feet in rear. It should have a shanty roof and should be so warmly built that water will not freeze in the coldest weather. With a building of this sort, together with good food and management, there is no reason why a farmer should not have an abundance of eggs all winter, especially if he keeps a good laying strain. It is best to have the floor of the house made of earth and sand, as they will not hold the moisture like a board floor. The perches should be made of 2x3 scantling, with the corners rounded off; with these perches there is no danger of crooked breast bones. The perches should all be placed on the same level and not placed one above the other, as fowl naturally try to get to the highest roost, and in a large flock this leads to injury to the fowl by the birds pushing each other off in their endeavors to get to the highest perch. This is avoided by placing the perches on the same level. They should be from two and a half to three feet from the ground The platform should be placed right under the roosts, and then under the platform the nest boxes. These should be movable so that they may be taken out, cleaned, and coal-oiled. They should be filled with clean chaff, and should be removed from time to time—never left long enough to get musty. The hen-house should be cleaned out at least twice a week in summer, and once a week in winter. The perches and nest boxes should be coal-oiled at least once every fortnight, and the whole house washed with whitewash to which has been added a little carbolic acid. If these instructions are carried out you need have no fear of your fowls being troubled with lice, and remember that prevention is better than cure, and most of the ills from which poultry suffer may be traced either directly or indirectly to the fact that they are troubled with lice.

Having secured your building, the next thing is to decide what class of fowls you will keep. If you want eggs and market poultry combined, especially for winter laying, I would advise you to make your choice from Plymouth Rocks, Wyandottes, or Langshans, which are all first-class winter layers, and also make good table fowl. Birds of these varieties under proper care will weigh, at six months old, seven and eight pounds a piece, and where can you produce a common barn-yard fowl that will do this?

Feeding is a very important factor in the production of eggs. For the laying stock, a warm feed, composed of equal parts of bran, oat chop and shorts, mixed with boiled potatoes or turnips, should be given first thing in the morning. Care should be taken to mix it so that it will crumble when thrown on the ground; do not let the birds gorge themselves on this, but only give them what they will eat up clean. At noon the meal may consist of wheat and oats, which should be thrown among litter in order to give the hens exercise in scratching for it. In the evening give the fowls all the grain they will eat. Buckwheat is one of the best egg-producing foods the hens can have, but it must be fed in moderation, as it has a fattening tendency, and an over-fat hen is useless as a layer. A thing that must not be overlooked in getting eggs in winter is that they have a regular supply of green food, which may be fed in the shape of turnips, cabbages, or cut clover hay; the latter is especially good but should be steamed before being fed. Animal food of some sort is absolutely necessary to their well being, and the best food of this kind is obtained by getting green bone from butchers and grinding it with a bone mill or breaking it up with the axe. It should be fed at the rate of one ounce per head three or four times a week. Grit, such as broken oyster shell, gravel, etc., should be placed where they can reach it at any time. Abundance of fresh water should be placed in the houses; also a supply of old lime and mortar.

The flock should be divided up into pens of twenty-five and thirty birds; in this way better results will be obtained than if the birds are all kept together. Each bird should be allowed five or six square feet of space.

In order to obtain the best prices for your eggs, they should be gathered once a day in winter and twice a day in summer. Eggs of different sizes and colors should be sorted and sold by themselves; all dirty eggs should be carefully washed before being taken to market.

A few words in regard to the profits in poultry. The question is often asked, will poultry-raising pay? In other words, is it a profitable business? If so, is it sufficiently so to warrant the investment of capital and expenditure of time? These are difficult questions to answer in individual cases. I believe the matter may be summed up about as follows: If the person engaging in it has a taste for it, and will display the same amount of care, judgment and energy, and take the same amount of time to study—to learn—its details that are displayed in other kinds of business, fewer failures will occur in this than in most other pursuits of the present day. If the person entering upon the business commences right and in a small way, gradually increasing it as he increases in knowledge and experience, there is little doubt that a larger percentage of profit will be realized on the capital invested than from any other kind of stock. The beginner must not be misled by this glowing statement, but must duly consider that such success can only be attained by vigilant attention and the best of care. There is, perhaps, no kind of stock that will sicken and die more quickly or eat their heads off with greater promptness than poultry when badly cared for, crowded in a small space where vermin wil prey upon their bodies, irregularly fed—one day starved and one day stuffed. Profits must be earned by a close attention to their natural wants. With good treatment your fowls will amply repay you.

There are great opportunities for those embarking in the poultry business who intend to devote their whole energies to it. Rightly gone about, a very paying trade may be done with the Mother Country (England). At present the export from Canada of eggs, etc., amounts to only $524,777, whereas England's imports from France amount to $5,350,000. There is no reason why we, farmers of Canada, should not compete for and obtain a big slice of the money that is now being paid to France. With our cold storage system to England all we need now is to improve our stock, take better care in preparing our birds and eggs for market, and there is no doubt that those who first take up the scheme will undoubtedly obtain the cream of it. This subject of better poultry, and better care and management of them, is well worthy of attention, and I would urge all farmers to look into the matter and see if their stock does not stand in need of improvement, and, if so, do not delay but make up your minds to do it at once, study the wants of the markets, cater to them, and I am sure you will never regret it.

POULTRY-KEEPING AS AN AID TO FARMING.

By Walter Phelps, Mohawk, Ont.

The uncertainty of the products of the farm these days demands that the farmer employ every agency at his command to augment his returns, and among the many things that belong legitimately to the farm there is nothing that promises as much and as quick returns as poultry-keeping. In fact the change of circumstances and the new demands which the growth and proximity of large cities bring, have almost revolutionized the old mode of farming by wheat-raising. Market-gardening, fruit-growing, dairying and swine-raising are now the leading lines of farming; and as a supplement to these branches of farm produce there is nothing that the farmer employs to increase his returns so profitably and quickly as poultry-keeping, especially so when you consider the outlay of capital and labor necessary to carry it on. Not that the hen is a new discovery, or that she has added largely to the comfort and luxury of living, but that she has become a source of revenue. Time was when the keeping of fowls was thought a kind of expensive luxury, and when the men endured them about the farmyard as a sort of compliment to the housewife, giving no thought or care as to what returns they were giving; and to mention poultry-keeping as a source of revenue to most farmers is only to court a smile of derision for your credulity. But we shall endeavor to show that it is a fruitful source of revenue and can be made much more so.

I well remember only a few years ago that one of the leading farmers of this community said that the hens were a perfect nuisance and that they ate themselves up two or three times a year. And this farmer stands as a sample of a large class of men who give the subject no thought or care. But there has come a conviction, very largely shared by the public, that poultry-keeping and raising is one of the most profitable industries legitimate to the farm. A near neighbor said, after very careful estimates of the costs, care and returns of her flock, that her hens paid her well. 'Tis not of much consequence when rich men keep fowls around their barns, because they can afford to as a matter of taste or luxury, but when the poor man keeps them there must be something more than sentiment in it. It must be that it pays to do so.

In 1895 a Mr. Stephens, of Pennsylvania, told how he made the surprising record from eight white Plymouth Rock hens of 2,312 eggs or 289 eggs per hen, worth in his market $5.02. He kept them in a house 12x20, divided into two pens 10x12. He fed granulated bone twice a week and gave beef meal every day besides the other ordinary and necessary care. A lady writes: "I had 12 hens and got 1,612 eggs, raised 64 chicks at a cost of $17.16, which at the prices ruling here would bring in a profit of about $1 50 per hen." Another gentleman, whose word is an authority on this subject of which I write, says that his large flock of about 600 gave him profits to the amount of $1.60 each, and another year, when things were more favorable, the sum of $2.92 ; and we might go on multiplying statistics of this nature, but take it for granted that the point I claim is conceded—that the hens do pay. But admitting that fact does not say that everybody can reach the same result, simply because they will not give the requisite care and attention. There is, perhaps, nothing about the farm that requires more care than that same hen, if you wish for returns. The hen, when once matured, is very hardy and will live almost anywhere, but she will not give any returns under such circumstances. The hen is an exotic and is not prepared for the exigencies of this cold climate and must have protection from the rigors of these low temperatures, and this is one thing of all others the farmer makes least provision for. Any little hole wherein the hens can creep or something on which to roost will do them. And while there is no place so well suited for the keep of fowls as where there is a large farm-yard of stock and where the hens have the run of the yard to scratch and pick up the waste, as there always is a lot under such circumstances, yet the farmer fails to gather the returns he should, because he neglects to provide comfortable quarters for them, and the other little necessaries quite essential for their profitable keeping. He provides for his horses, cows, sheep and hogs, but the hens must take pot luck, and when such is the case there is no use to expect profitable returns.

A farmer out west, who keeps 70 cows and 400 hens, says he made more money out of his hens than he did from his cows, and there is but little doubt that every farmer could secure from $100 to $500 from a well conducted poultry stock of 100 to 500 hens. No farmyard should be wanting the necessary provision for carrying from 100 to 200 fowls, for there is nothing on the farm that will give greater returns for the amount of money invested and the labor bestowed. From a number of well attested experiments there is no doubt about the profitableness of this branch of farm industry. And when the logic of facts proves or solves this problem to men's minds, there will be no difficulty about provision for carrying on the business successfully in connection with the other branches of farm labor.

When this subject is fully understood there will be more earnest effort to place it on the plane it should occupy in this country. The demand for the product of the hen by Great Britain amounts yearly to about $60,000,000, and Canada's quota in supplying this demand is only $807,086, of which Ontario supplies but $397,770. This amount is not at all commensurate with her ability to meet this demand. There is no limit to the extension of this business in our lifetime if the right class of eggs and the right quality of fowls are produced. I have only dwelt with the produce of eggs, but there is quite as much demand in England for a certain quality of dressed poultry as for eggs, and now that the cold storage system of this country is in full operation there is an unlimited demand for that kind of product. If our farmers would enter this business with earnestness and intelligence the volume of trade between this country and Great Britain would soon reach into the millions. I have tried to augment the interests in poultry-keeping among the farmers, and whatever the defects of my paper I hope no one will attribute it to the weakness of the cause I espouse. The product of the hen has become a prominent and imperative demand upon the markets of the world, and the question is not shall we go but how far shall we go in meeting that demand.

A FEW HINTS ON MAKING POULTRY MORE PROFITABLE.

By D. C. Trew, Lindsay, Ont.

It is an undisputed fact that there is no department of live stock that is so generally neglected or managed with so little knowledge of its requirements as the poultry. We meet farmer after farmer who is not making anything like the profit—if indeed he is reaping any profit at all—out of his poultry that he should make. One of the reasons for this state of things is that generally a farmer's flock of poultry is made up of all birds of all ages, from those miserable, worthless and unprofitable youngsters that are hatched out of stolen nests late in the fall to the long since worthless old hen that never lays. No hen should be kept over three winters

I would strongly advise every farmer who finds himself in possession of such a flock to kill off all late chickens and all old hens not through their moult before the first of January and keep only those completely through their moult and in good condition. These, no matter how few they are in proportion to your flock, are the only ones you should keep through the winter. We must get eggs in winter if we are to obtain the greatest return from our fowls, and only early hatched, well-matured pullets and yearling hens will furnish us with winter eggs in paying quantities. I would advise all farmers to have a breeding pen in which to place ten or twelve of their very best females and a male of some pure-bred variety. By breeding from the best layers you will, in a very short time, materially increase the laying qualities of your flock. There is no stock on the farm that can be so rapidly improved as the poultry. Hens have been bred to increase their egg production from 150 to 250 per year in a few years. It costs but little to obtain these results. Separate the males from the females after the breeding season is over. Experiments which have been conducted go to show, without exception, that hens without males will lay fully from ten to fifteen per cent. more than when with males. Everybody who sells eggs knows that during summer, with all the precautions taken, they cannot always get perfectly fresh eggs—some of them, in spite of all they can do, will go bad. Our egg dealers and those who use our eggs are constantly finding bad eggs amongst those laid on the farm. The cause of this is that if the fertile egg be exposed to a heat of ninety degrees or over life will start. Our midsummer weather often reaches ninety degrees in the shade. How often you go one night and gather the eggs from a certain nest and the next night go to the same nest and find a hen sitting on five or six eggs. You know she was not on there the previous night and foolishly thinking the eggs are all right you place them amongst the others. The fact is that life has started in them, and when they become too cold for that life there is death and after death follows decay. This is the source of bad eggs. Now, let us look at the infertile eggs, there is no life in them and all a hen can do by sitting on them is to dry them up. A large portion of an egg is water and this evaporates when subjected to heat or left exposed. Suppose a hen should sit on a nest of these eggs for months she could not make them bad. There could be no decay. When we keep no males in our flocks we will be able to supply our customers with an article that will give satisfaction.

A few words about feeding may not be out of place. For my part I believe in feeding three times a day. In winter I would feed the morning meal warm, say shorts, bran and chop mixed pretty dry; never give a full feed. After you have given a small quantity of the soft food throw a few handfuls of mixed grains in the straw or chaff and keep the hens working all day. Sloppy feeding and impure dirty water are often the cause of inflamation of the bowels, cholera, dysentry and death.

I believe in having the henhouse floored no matter what kind of soil your house is built on. You cannot keep an earth floor perfectly dry all the year round. Dampness causes a great many of the diseases to which poultry are subject. Keep from eight to twelve inches of sand and fine gravel on the floor all the time.

Cleanliness is the next very important part to insure success. Have everything arranged conveniently so that you can clean the house out every day, as you do all the other animal houses around the farm. One of the greatest mistakes made in keeping poultry is in keeping them in too small quarters. In winter no manner of feeding will obtain for you the average return from a flock of crowded hens. Each hen should have from five to six square feet of floor space. Keep your hens warmly housed and follow the above instructions and there is no doubt you will get eggs in winter. Statistics show that the hen brings more money into the country than all other live stock put together. She brings us over three million dollars annually under the present care—what would she do if properly cared for?

How best to keep vermin down. Fumigate with sulphur twice a year. Also whitewash once a year with strong lime to which add two tablespoonfuls of crude carbolic acid to a pailful of lime. Also saturate your perches about twice a month with coal oil and crude carbolic acid. With the above and the aid of a dust bath I will guarantee that you will not be bothered with vermin.

PEKIN DUCKS.

By J. E. Meyer, Kossuth, Ont.

There is a very prevalent idea amongst poultry raisers and farmers that duck-raising is not profitable, because the duck, they say, eats more than it is worth. This is a very erroneous idea, and it has been abundanly proved that when you have the proper variety of ducks and handle them properly there is no branch of the market poultry business that pays larger profits or brings in quicker returns.

The best variety of ducks to breed for marketing is the Pekin. They attain the greatest weight in the shortest time. They lay by far the most eggs, 100 each being a common number per year under good management, and if extra well cared for they have laid 140 in a single season. Their feathers are the most valuable.

Characteristics. In color, the Pekin is a creamy white. Its body should be long and wide to the stern; its breast large, broad and deep; its back slightly curved and wide, and its wings short. Pekin ducks are unable to fly. The average weight of the male is about nine and a half pounds. The feet of both male and female are red, and their beaks are a deep orange in color. A female in perfect condition and just before beginning to lay will weigh eight pounds.

Breeding. Always use the early hatched ducks for your breeders and mate with them a yearling or two year old drake. Place them mated into their pen in December, and do not move them to another pen during the season, for if you do you will stop their laying for a time. In the early part of the season put four ducks with each drake, and later you may put five or six with each drake. Ducks hatched in March will, when well fed, often lay in September, but they will not lay continuously. They will begin in December and under proper conditions continue laying into July. Do not set the first ten or twelve eggs a duck lays as they are not likely to be fertile, but after that they are more fertile than hens' eggs.

Care. Pekin ducks do not need a warm house in winter, for they are covered with a very thick coat of feathers as well as with an abundance of down, but their feet are liable to get cold. Always keep plenty of dry litter on the floor of their pen. They lay their eggs at night or early in the morning and cover them over with litter, so that even in cold weather there is little danger of their eggs becoming chilled if you gather them first thing in the morning. After the weather is such that they can have their liberty during the day never allow them out of their pen until all have laid, and you must always confine them at night or you will lose their eggs, as they drop their eggs anywhere when at liberty.

Feeding. Never feed ducks, young or old, whole grain. They will eat any kind of meal moistened that you choose to give them. During winter give them an abundance of green food. They require grit at all times. Laying ducks as well as young growing ducks require meat of some sort for best results. While laying or growing, feed concentrated food; keep them always filled up. After they have quit laying any cheap, coarse food will do them so long as you keep them filled. They have a bad habit of trampling all over their food, so that you should contrive to feed them so that they must put their heads through between slats to reach their food. This applies to young as well as old ducks. It is not necessary that they have water to swim in, but they must always have water before them to drink. On no account allow the young ducks that you are forcing for the market to get into a creek or pond. It only hinders their growth.

Profit. Your whole aim should be to get as many early ducklings as possible, because it is from the sale of these that you will obtain the greatest profit. Feed the young ducklings as well as you possibly can until they are nine or ten weeks old, when they should be sent to market. Kill them when they have the least pin feathers At this age they should dress from eight to ten pounds per pair, and pay you well if you get them on a good market in the best possible shape. Their feathers are of the very best quality and worth considerable. There is no money to be made by hatching out a lot of ducklings in the spring and letting them roam all over, half starved all summer and then fattening them for Thanksgiving or Christmas. Handled in this way your ducks will bring you in less money than they cost you.

MANAGEMENT OF GEESE—OLD AND YOUNG—WHY THE TOULOUSE ARE THE BEST—HOW TO FEED.

By J. E. Meyer, Kossuth, Ont.

The American standard of perfection recognizes six varieties of geese as pure bred, but only two of these are well known, viz., the Toulouse or large gray geese and the Embden or large white geese. These two varieties are the most profitable for the farmer to raise, and of these two breeds the Toulouse is undoubtedly the more profitable. The Toulouse is amongst geese very much what the Pekin is amongst ducks. They grow the largest, mature the quickest, do not ramble and fly too much, do not take so readily to water, and so grow more rapidly and take on fat faster. They are quiet geese.

Breeding. It is not a very easy matter to distinguish the sex, as there is no very noticeable difference in the conformation of the gander and goose. There is no use looking for the curl in the tail feathers as in ducks as there is none, but after the young geese have reached maturity, or six or seven months of age, you can by close observation distinguish the ganders from the geese. The male, in most cases, grows a trifle larger than the female. The body of the female is deeper, its neck slimmer and its head smaller. The call of the gander is loud, long and shrill, while that of the goose is merely an answer to it.

When in proper condition young geese will lay from eighteen to twenty-four eggs the first season and old geese will lay from thirty to forty eggs in a season. Never kill off your old geese as long as they are laying well, because they will lay more and give better results generally up to ten years of age than young ones. The gander will be profitable up to six or seven years of age. Allow two geese to one gander.

Care of Breeders. Geese will not thrive well in confinement. They must be allowed to run through a pasture where they can get plenty of grass on which they will live almost exclusively from early spring until late fall Do not feed too much grain in winter, especially corn, or you will get them too fat. Feed largely on roots and cut clover hay, steamed in winter, and oats and barley. There is no danger of spoiling the appetite of a goose by feeding it too much. They will eat only what they need. Feed the grain in troughs, removing what they do not eat up clean in winter, when they have a limited amount of exercise and are apt to become over fat, but while they are running in the pasture you may leave the trough full of grain all the time if you wish and they will not eat too much. Toulouse geese do not need enough water to swim in. If they have plenty to drink they will do well.

When properly cared for some of your geese will begin laying in February. Provide snug out of the way places with plenty of clean straw for them to lay in. Gather the eggs every day, being very careful not to disturb a goose while she is laying, and leave the nest egg as near like you found it as possible. Leave some sort of an egg for a nest egg. Keep the eggs in a cool place and turn them every day until ready to set. You may give the eggs to the goose or to a large hen. By setting the eggs under hens you will get more young because you can keep the old goose laying. If you are going to use hens set a number at a time, and on sixth or seventh day test out all the infertile eggs and put the fertile ones under fewer hens, giving each one four. When the old goose becomes broody destroy her nest and shut her in another yard with another gander for four or five days, when she will have forgotten about setting and may be turned into her old place again and will soon begin laying again.

At the end of thirty days the young goslings will put in an appearance, and it will be best for you to keep a close look out because some hens become frightened when they see the goslings and are likely to kill them. It will be safest to remove the goslings as they hatch and give them to the slow, quiet, hen that will not hurt them.

Feeding the Goslings. Feed soaked bread and water for the first two or three days and keep them warm. If the weather is warm turn them out in an enclosure made of foot wide boards. Move this to clean grass every day. After they have been in this enclosure for a week let them run at large, so that they can get all the grass and clover they want. Besides this, for the first four or five weeks feed them dry, not soaked, stale bread. After five weeks feed a *dry* mash made up of bran, middlings and corn meal. If you do not wish to fatten them feed about two-thirds bran and one-third middlings or corn meal, but if you intend to fatten them feed more corn meal and middlings, say equal quantities of bran, corn meal and middlings.

Never allow goslings to go to the water to swim until fully feathered, and then let only those go that you wish to keep for breeders. Any of them will keep their flesh better and grow fully as well if they never see water to swim in.

When properly fed, goslings when nine and ten weeks old will weigh from twelve to fifteen pounds. This is the best time to market them, as they will bring more money than in the fall and winter, and you have no trouble fattening them. In the larger cities of the United States there is great demand for these *green* geese at from eighteen to twenty-five cents a pound, and there is more profit in them at this age in this country, too, than keeping them until Christmas when they will weigh very little, if any, more and bring less per pound.

It is a wrong idea that geese and their droppings will destroy pasture. They must have plenty of room or they will eat off the grass very close but not destroy it.

Geese of the proper variety and properly handled are more profitable than either ducks or chickens, but they cannot be raised in such large quantities. Their feathers are well worth considering, but do not pluck your old geese twice a year and expect them to be good breeders. A goose so treated will not lay as early, as many or as fertile eggs as one left to moult naturally.

Geese are easier to raise than any other fowl, as there is very seldom any mortality amongst young stock. The old birds are sometimes troubled with lameness when in confinement in severe winter weather. Keep their quarters well littered with clean, dry straw and as soon as any appear lame place them by themelves on plenty of straw and feed light food, as vegetables or stale bread, for a few days. For diarrhœa give a tablespoonful of castor oil.

The demand for nicely fed, well dressed, young geese will always be greater than the supply, and the extreme cheapness with which they can be raised on our farms makes them the most profitable, when properly handled, of all fowls that we can raise.

CARE AND MANAGEMENT OF TURKEYS.

By J. E. Meyer, Kossuth, Ont.

The best known and most popular variety of turkeys grown on our farms is the Bronze. They are the largest, often weighing as high as forty pounds for males and twenty-five pounds for females. The white turkey, the only other variety grown to any extent, is much smaller, but in every other respect we believe equal to the Bronze. It is claimed that they are tamer and less given to hiding their nests than the Bronze. The turkeys generally grown for market are not the pure Bronze, but are crosses of Bronze on common stock, and so do not grow as large as pure bronze. The market does not demand the largest carcass, and the greatest profit is derived from medium sized but quick maturing turkeys. By carefully selecting your breeders, using only those that mature earliest, are the quietest, etc., you can soon have a flock whose characteristics will suit you. We once kept as breeders young hens that we hatched in an incubator and reared in a brooder. They were tame, in fact we could pick them up almost anywhere. When they layed they made their nest in the barn, showing no inclination whatever to roam off to the woods near by. The eggs from which these hens were hatched were hidden by their mother in the woods fully half a mile away. We like to be able to handle our turkey hens and have them trained to come home at night and not wander far enough away to become an annoyance to our neighbors, and we know that it can easily be done and that it is profitable to do it.

During the winter you must provide a shelter for your turkeys, but they must not be confined altogether. They will not thrive as they should if they feel that they cannot if they wish wander out of their pen.

Winter Feed. As the turkey hen is not expected to lay before the latter end of March or beginning of April, she should not be overfed during the early part of the winter. If fed on nothing but corn, for instance, she would likely become too fat. Wheat and oats are the best grains, but neither will do to feed to them exclusively. Feed cut clover hay, mangels, turnips, potatoes for green food, and green cut bone, as you do your other poultry. In the early part of the winter feed more of the cheaper food, and as laying time comes on, besides a reasonable amount of green food, feed more grain. Always keep grit where they can get it and see that they have fresh, clean water always.

Breeding. You may put as many as ten to fifteen hens with a strong, vigorous Tom, or you may put less. If possible, coax the hens to lay near or in the barn, by making secluded places with everything necessary to make a comfortable nest where they will be most likely to find them. Gather the eggs each day but leave the nest undisturbed, for if you do not the hen is likely to hunt another nest. Keep a nest egg or two in the nest. Keep the eggs in a cool place and turn them each day.

When your turkey hen becomes broody, if you intend to set her see first that her nest is clean, and put tobacco stems under the straw in it and dust all well with insect powder. After the hen has started to hatch dust her thoroughly with insect powder too. Above all things keep all vermin away from the hen and the nest, for the vermin cause the death of more young turkeys than anything else. As the young turkeys hatch, remove them from the nest and place them well covered with flannel under the stove in a box. This precaution will keep the hen from crushing any of them in the nest. Do not feed them before they are at least twenty-four hours old. As soon as all are out remove them and the hen to a pen in which the young may be confined for a few days at least. Place them on short grass as they are very fond of it.

Another way to raise turkeys and one that, like the one just mentioned, has its advantages as well as its drawbacks is to set the turkey eggs under chicken hens with precisely the same precautions against vermin, same care as to nests and same attentions generally as you would if hatching chickens. When raising turkeys this way you should aim to keep the turkey hens laying as much as possible, to do which it will be necessary to break the hen off as soon as she becomes broody by destroying her nest and confining her with the Tom away from her old quarters for a few days.

After the hen has brought out her brood of turkeys, place her in a bottomless coop placed on dry ground covered with short grass. Make a small pen in front of or about the coop into which the young turkeys can run. The coop must be removed to a clean place as well as the run every few days. There is no better food for young turkeys than curd. Stale bread soaked in sweet milk and pressed DRY is very good, and onions and onion tops are excellent for them. Feed regularly four or five times in a day at first and just what they will eat up clean. Never allow them to get any sour food. After the first week give them a little wheat and they will soon learn to eat it. By that time too they will be able to eat moistened middlings and crushed oats or any ground grain, as well as the curd and table scraps. After they have got nicely started they may be allowed to run at large with their mother. It is well to keep them out of long wet grass until several weeks old, and if you can possibly do so do not allow them to be out in the rain before they "shoot the red." They cannot stand being wet. Lice and wet are the two great drawbacks to successful and profitable turkey-raising, and you must fight both of these incessantly if you are going to succeed.

Start to fight the lice the day you set the hen and continue fighting them until you kill the turkey. Mix lard and a little coal oil together and rub under the hen so that the little ones will get some on their heads especially. Use insect powder freely, keep everything scrupulously clean and put coal oil about the coop they roost in. Do not put lard ON small poults, but after a week or two old you may put a small quantity on the head, under the throat, wings, and about the vent. Remember too much is fatal. When the poults are old enough and have an opportunity to dust themselves they will fight the lice off pretty well, but a dusting of insect powder occasionally will more than pay you.

Turkeys may be hatched and prove profitable as late as July 15th. Those hatched at that time will make nice ones for Christmas and a little later.

We always found that it paid best to feed our young turkeys so as to have as many as we could ready for the Thanksgiving trade. Up to that time there is very little severe weather for them to encounter, and they, in consequence, fatten on less feed. Those intended for Christmas will not need to be heavily fed so early.

To kill turkeys we prefer cutting them in the roof of the mouth. This method requires a little practice, but one can do it properly without any difficulty. Hold the bird under the left arm with the head in the left hand and mouth held open. After cutting hold a moment and then slip a rope over both legs and hang up, head down. Begin plucking as soon as dead, pulling wing feathers first, then begin at top and pull all as you go down towards the head. Pluck them perfectly clean except a few feathers about the neck, and make them look as neat as you possibly can.

Diseases. We never had very much inclination to doctor sick birds. We have always found it best to keep them well where care will do it, but there is certain to be some sickness that can be easily treated. If a bird will not yield to treatment in a reasonable time it should be killed.

A common disease amongst turkeys is swelled head caused from cold. Bathe the head with hot water, in which put a very little carbolic acid. Inject coal oil into the nostrils so as to clean them out. Get the passage clear if possible, in fact you must work until you do get it clear. Give a dessert to a tablespoonful of castor oil. Repeat bathing and coal oil once a day for three or four days, and give three grains of bromide of potassium every night and morning for some length of time. When the bird begins to recover give nourishing food, and if it does not show signs of recovery by this time you had best kill it.

Gapes. To prevent this disease put a little turpentine in the drinking water and feed onions. Keep the ground on which the young bird sleeps sweet and clean by spading it up occasionally if it is not a grass plot.

If the young birds are troubled with diarrhœa, dissolve enough extract of logwood in their drinking water to color it well. Dissolve the extract of logwood by pouring hot water over it and then use the dissolved mixture to pour into the drinking water. You may use it as strong as the case appears to require.

Your birds will seldom be sick if they are fed and sheltered properly and kept clean. Do not feed your young turkeys too much at first. They should be kept picking all the time. Put them where they can get grass and insects and grit.

HOME AND HOUSEHOLD DEPARTMENT.

ORGANIZATION IN THE RURAL DISTRICTS.

By Mrs. Adelaide Hoodless, Hamilton, Ont.

The latter part of the nineteenth century may well be called an era of organization. Each society, business, trade or profession has its organized union. It is a question in some minds whether this is to be considered an unmixed blessing or not; but has there ever been an effort made for a better arrangement of matters generally without some "carpers" and "death heads" who make it the business of their lives to object to everything which is not strictly in accord with their method and idea of doing things?

In no section of a community are progressive ideas more difficult to develop than in the remote rural districts. This is easily understood when the circumstances under which they live are compared with the advantages provided in the more densely populated places. Not having opportunities for seeing the result of new methods, and living such monotonous, tread-mill lives, the mental energies become stultified and the receptive faculties benumbed.

We are told by economists that every skilled laborer is a benefit to the country. Then surely every scientific farmer and farmer's wife must be even more valuable as an economic factor, as they are the props which support the whole economic structure. Life in the country during childhood, with its freedom from excitement, its pure air and regular hours, permits a normal development the effect of which is demonstrated in the numerous successful business and professional men and women to be found in the larger cities. Now, why should the bright boys and girls drift citywards? This is a hackneyed question, but one which will bear persistent agitation. It is easily answered if people will only recognize the cause. The old adage "There is no one so blind as the one who will not see," is particularly applicable to the residents of the rural communities.

Think of one agricultural college for the whole of Ontario, in comparison with the universities, colleges, collegiate institutes, high schools, seminaries, etc., for the development of professional life, and then wonder why the bright boys and girls leave the farm. When a scientific knowledge of agriculture—stock raising, dairying, poultry and bee keeping, fruit and flower culture, domestic science, preserving the various fruits and vegetables, and the hundred and one things connected with farming—becomes a recognized factor in our educational institutes, and receive equal respect with the other professions, then, and not till then, may we expect agriculture to receive the attention it deserves. When a diploma in any of the above named subjects, combined with a good general education, takes equal rank with a certificate to teach modern languages, mathematics, history or geography in the educational world, then we may expect the bright young men and women to accept those duties. The difficulty in the past has been to convince the rural population that mental attainments and a trained mind are necessary for the performance of the duties required on the farm—a combination of energy and trained intellect, with associations of a kindred character, mutual sympathy and co-operation in such matters as shipping farm produce, local organizations, such as Farmers' Institutes, with a women's department, not meeting once a year but every week or two; local schools of agriculture and domestic science within reach of every boy and girl, held in the evenings if not practicable during working hours. Such conditions would do infinitely more for the development of agriculture, with its consequent far-reaching influence upon the country at large, than the present system of providing in each district a preparatory training school for the professions only. It is a slow and up hill task for one agricultural college to disseminate sufficient knowledge to remedy ages of neglect in this direction.

When the fact has been taken into account that absolutely nothing has been done to arouse the intelligence of the farmers' wives and daughters to the same scientific level as the graduate of the agricultural college, is it any wonder that so many of the graduates drop back into the old rut, not being able, single-handed, to combat traditional customs which have become so deeply rooted in the average home? Until the women of our rural districts are interested and aroused to a higher conception of their duties, and the need of their active co-operation with the men on the farm, little progress will be made It is rather ludicrous for a man to carefully study the food question in its relation to the market value of cattle, sheep, pigs, etc., when his own diet is left to hap-hazard, and by the time his cattle are in prime condition he is such a chronic dyspeptic, with all the accompanying evils, that he cares little whether the returns are satisfactory or not, and has little ambition left to apply his acquired knowledge or gain to further advancement.

It is not necessary for women to work in the fields. But there is a distinct woman's work in the country and on the farm as well as in any other condition of society. A scientific education, mental development and wholesome recreation are absolute necessities for the women on the farm. How is this to be secured? First, by providing, in every district school, a thorough course of training in domestic science in conjunction with other studies. Impress upon the pupils the scientific facts underlying all household work. After leaving school, for the further development of this line of education, organize in each district a women's department of the Farmers' Institute, or, as in the United States, women's clubs for farmers' wives, where papers may be read on various subjects of interest, followed by discussion and interchange of ideas, giving a new zest to every-day affairs. Organize reading circles, have a joint meeting once or twice a year with the Farmers' Institute, and, above all, plan an occasional entertainment

One of the saddest features of social life in the country is the lack of sympathy and mutual helpfulness between the women of a community. In no way can this be remedied more quickly than through organization. Give each member a special work to do. The reading and enquiry called for in the preparation of a paper on some given subject will do more towards awakening the mental faculties, which, by years of hard, monotonous labor, have become sluggish, than all the lectures and sermons—theories—with which the average woman is deluged. Individual responsibility must be aroused. The farmer's wife must be made to realize her power, and opportunity provided by which she may acquire the necessary knowledge to enlighten her to make life in the country so attractive and remunerative that the over-crowded avenues of labor, with their struggling, unsettled, unhappy human machines, will stand out in such marked contrast with the higher life in the country that instead of the bright boys and girls being drawn citywards they will be proud to belong to the rural population.

Let the farmers and farmers' wives unite in a general demand for mutual advantages, and not, as heretofore, to a one-sided development.

WOMEN'S INSTITUTES.

By Miss Laura Rose, Lady Instructor in Dairying, Ontario Agricultural College.

Statistics prove that more women on the farm go insane than in any other sphere of life. A rather startling statement to commence a talk with, and yet one which bears forcibly on the advancement of my subject, viz., the establishment of women's institutes throughout the country. The insanity is attributed to the monotonous lives the great majority of women on the farm live. Each day, from early dawn till night lets fall her curtain, full of work, one day differing only from another in that on Monday comes washing, Tuesday ironing, Wednesday mending, Thursday churning, Friday sweeping, Saturday baking, and Sunday a general hurry to get off in time for church. Yet for all their efforts, bringing weariness of limb and backache, you hear them say,—

Labor with what zeal we will.
  Something still remains undone,
Something uncompleted still,
  Waits the rising of the sun.

Honest, healthful toil is a God-given blessing, and if we would be happy and useful we must do our share of the burden-bearing. Some poet has said "a weary, wretched life is theirs who have no work to do." On the other hand how many people we see prematurely old and wrinkled by doing too much—people who see no other use for this beautiful world than to make a work-shop of it.

I am not going to say the men expect too much from their wives and daughters. Some of them do, but my observations are that men are improving and becoming more considerate. It now largely rests with the women themselves to what extent they will be slaves to their homes and families. There is just one word I would like to whisper to the men. If you want to lighten the labors of your dear ones, show them by your constant little acts of thoughtfulness and many kind words that you appreciate and enjoy the well-kept home and wholesome, neatly served meals. I known of no medicine that acts with such a magic charm to relieve the aches and pains of hard labor as a little praise, and yet we are so stingy in doling it out. Many farmers' wives are starving for some slight acknowledgment of their untiring efforts. The greatest famine the world is experiencing is the famine of love.

"Amid the cares of married life,
In spite of toil and anxious strife,
If you value your sweet wife,
Tell her so!

"There was a time you thought it bliss
To get the favor of one kiss;
A dozen now won't come amiss,—
Tell her so!

"Never let her heart grow cold—
Richer beauties will unfold;
If she's worth her weight in gold—
Tell her so!"

I am glad I have lived on a farm; glad I know what it is to rise each morning at five o'clock; glad I know of the work and thought required in cooking for a three or four days' thrashing; glad that through my lack of knowledge at that time I have churned till nothing remained of my strength or patience but a determination to get some kind of butter out of the churn. And why glad? Because there is nothing like similar experiences to enlarge one's sympathies, and so there is no class of women I am as much drawn toward, or wish to help, as the women on the farms. For this reason I see and feel the great benefit Women's Institutes would be to them. The average woman has her time more than occupied with the multitudinous duties of her surroundings, and finds but little if any leisure for entertainment or culture. Still if less thread was crocheted into untidy tidies, and the patches, which go to make quilts boasting of their hundreds of blocks, were consigned to the ragman, not to mention the elaborate embroidery and drawn work so very trying to the eyes—women would have more time for reading and sociability, and the result would be stronger nerves and happier dispositions, Our minds have vastly more to do with our physical bodies and health than we conceive of; many a women is ill because she thinks of nothing but herself and her hard lot. Give her other food for thought—let her mind reach out to nobler and higher things, then note the improvement.

I attended a meeting of the Women's Institute at Stony Creek and was surprised to hear the variety and usefulness of the topics which had been presented and discussed during the year—topics of vital interest to every woman, but which would take a great deal of time to give personal study to. All attending the meetings get the benefit of the study the two or three appointed ladies have given the assigned subjects.

These meetings develop confidence and assurance in retiring, timid women—and our country is full of them. These same women surprise themselves and their friends with their ability to prepare and read a paper on some domestic subject, and there is nothing better for developing character and intellect. It makes one think better of one's self, while at the same time it takes one's thought off self, and broadens the mind and influence of the person.

My own experience proves that if any time is soon enough to read a book—any time will do to answer the letter—the book remains unread, the letter remains unanswered; but if the book has to be returned by the end of the week or the letter replied to by return mail, in some way or other time is found to do it in. So it is with attending the Institute meetings. If you are really interested in and wish to be benefited by them, you will so arrange your work that whether it rains or shines you will be there, and there on time. Only with such a purpose in the heart of each member can the Institute be a real success.

Women should look at it in the light not only of a duty but a privilege to belong to such a society, and should do all in their power to establish and maintain one in their locality.

We hope soon to have Women's Institutes just as numerous and flourishing as the Farmers' Institutes are in this prosperous Province of ours.

THE IMPORTANCE OF DEVELOPING A HEALTHY SOCIAL AND INTELLECTUAL LIFE IN THE FARM HOME.

By John I. Hobson, Guelph, Ont.

Amongst the many changes which have gradually taken place in farm life of late years in this country, a very noticeable one is the marked difference, compared with former years, of the relative social position of the farmers and the farmers' families as compared with those who dwell in our towns and cities.

Not a great many years ago there seemed to be but little in common between the farmers on the one hand and the professional and commercial men on the other. It is very true that when it came near an election time many very nice things were said to us; we were told that the farmers were the bone and sinew of the country—that we were the producers of the country's wealth, and a good deal more of that sort. There is no getting over the fact that in days gone by there was a pretty clearly defined line between the people of the towns and cities and those whose lives were mainly spent upon the farm. That state of things, for the good of all concerned, is now in a large measure changed. All classes now apparently realize that there is a close association of interests between all classes. In the early days of Canadian farming there was but little to break the monotony of work, all day long, from early morning until late at night, and that all the year round. As labor-saving machinery has come more into use, much of what was the most laborious work is easily performed. Along with the change which has been going on there has been a growing tendency everywhere with farmers and their wives and families to have nicer and better furnished homes; a farm house without musical instruments is now the exception and not the rule. This is as it ought to be; it has been and is being demonstrated in thousands of farm homes in this country that there is nothing incompatible between cultured minds and refined tastes and successful agriculture. This change, and it is a good one, is not confined to our own Province, it is going on everywhere. I spent some weeks travelling in Manitoba and the Territories in 1894. Last summer I again spent a couple of months in the west. The change that has taken place is most marked, and everywhere for the better. Perhaps someone may say, why for the better? The answer is this, there is no class in all the community who better deserves a fair share of enjoyment in their homes than do the farmers of this land; none have worked harder for it. This change has had much to do in making our sons and daughters more contented with farming as an occupation. One of the most fruitful causes of discontent, and one of the chief reasons which has caused many farmers' sons to leave the farm for other occupations, has been that lack of pleasant social life which is to be found in a greater degree in the cities and towns than in the country. If there is anything in this, and unquestionably there is, the remedy lies largely in the hands of farmers themselves. There is, perhaps, no other man in this country who has had greater opportunities of studying out this phase of farm life than I have had, and I am free to say that I have seen as much real social enjoyment on the farm homes as one can reasonably expect to see in those of any other class of the community. I have seen many a farmer making himself rich by successful farming whose home was a model of what a good home ought to be, his family growing up around him happy and contented, and each member laying in stores of knowledge obtained from good books, periodicals and papers. Such young people are the peers of any of the young people in town or city, both in culture, refinement and intelligence.

One of the grandest homes I ever was in was in the far-off ranching country of our great Northwest, not very far from Fort Walsh. I spent a day and a night in that plain but comfortable home, six miles from the nearest neighbor, and rarely have I seen a happier or more contented family. Closely in touch were they with all that was going on in the outside world. Besides their books a glance around showed that a few of the best periodicals of the day kept them well supplied with that food for the mind which is so essential for intellectual growth, and which ministers to that training required for good citizenship and successful business operations, while for the daughters the reading of carefully selected literature made them broader minded and more intelligent women, and in later life will make them better wives and better mothers. This is by no means a fancy picture; homes like this are to be seen all over our broad Dominion; they are to be found scattered all over the land, from the foot of the Rocky mountains to the Bay of Fundy. I have seen them everywhere. It is not in families like these that we need speak of the importance of developing a better and healthier social and intellectual growth; it is those who have gone out from homes like these who have done so much to make Canada what it is—the fairest and foremost of all colonies of the British Empire. It is those whose early lives have been spent in such homes, whether it be in city, town or rural district, who make successful men and worthy citizens, and who are doing more, perhaps, than they themselves are aware of in working out the destiny of our land.

But there is another class the members of which, like the first mentioned, are to be found wherever we go. They are very numerous—men who think they have no more to learn, and will not use the means of acquiring more knowledge themselves nor give their families an opportunity of doing so. These men are often money-makers—or rather savers—not spending a cent that can be avoided. Little is done by them to make the lives of those dependent upon them cheerful or happy. Their homes are often found to be cheerless and the surroundings uninviting. Visit their houses and there is no literature worthy of the name. What chance of succeeding in life have the young people growing up in such homes? If their daughters make bad marriages who is to blame? If their sons, craving as young people will for company, try to find it at the village or country tavern, whose fault is it? If others, who have been brought up in more favored homes, beat them in the battle of life, can it be wondered at? Give the boys brought up in the country a fair chance and they will hold their own, and more than their own, with those brought up in the cities and towns. Depend upon it, there are no conditions in life more favorable for developing sturdy energy and manly self-reliance than those which are to be found in the well-regulated country homes. It is there that habits are formed and character built which enable the young men from the country to hold their own when they come in competition with other young men in the great battle of life. There is great responsibility resting upon parents. It is in early life, when the moulding influences are the most powerful, that character and habits are formed for either good or ill. If there is nothing stronger than the contents of trashy novels for the young mind to feed upon, or perhaps at most a local paper, what chance have young men growing up under such conditions of holding their own in after life against men whose minds are well equipped and whose practical training fits them for carrying out successfully the occupation of their life?

There is this also, we must bear in mind, that of late years a great change has come about in farming. A farmer can no longer make money as easily as he could twenty years ago The land has become less productive, and every farmer knows that with all the advantages we have in the use of improved machinery and farm implements, that it costs much more to produce a bushel of wheat than it did before the days of sulky rakes, horse forks, and self-binders, and that in the matter of producing beef it is only by carrying out the most scientific and economic system of feeding that there is any margin whatever left for profit. The time has come when brain power and the knowledge of those sciences bearing upon agriculture are going to be more important factors than they have been in the past. The day has gone by when we can afford to spread our labor over many ill-tilled acres. The successful farmer of the future is going to be an educated man. It is very noticeable that there is a growing disposition on the part of nearly all civilized governments to foster agriculture and assist agricultural advancement by means of the higher education of farmers' sons. This is as it ought to be. We are living in an age of progress, and why should farmers lag behind? In all the advancement that is going on in every industrial calling the powerful factor is, and has been, intelligence. Intelligence produces the same results whether in the workshop or on the farm, but the education required for the one does not fit a man for the other. Each requires a special knowledge and training. Besides a farmer requiring a general education to enable him to fill the position of a good citizen, it is just as important in his calling as in that of any other, that he should have a *special* education. There is no doubt that there are many men who can make and save money on a farm who have given but little time to studying the theory and science of agriculture. They may do that, but the chances are very much greater that the active, thoughtful, educated farmer will win and be successful. To the young men who are to be the farmers of the future I say, never forget that the real education of life begins after you leave the school room or the college. Upon you rests the responsibility of doing something to raise the status of farmers and the standard of agriculture. With that end in view place before yourselves a high ideal and strive to attain it. Develop a fondness, a love for your calling. "What we love to do, we do well."

A COMMON-SENSE TALK TO YOUNG FARMERS AND THEIR WIVES.

By Mrs J. L. Smith, Whitby, Ont

To young farmers who have lately established themselves in homes of their own my remarks are chiefly addressed. They will be applicable also to those who in the near future contemplate taking upon themselves the responsibilities of married life and locating in our rural districts. You hope to succeed; perhaps a thought of the possibility of failure has never entered your mind. You are in the heighday of your youth and strength; to you disappointment and loss and failure are things that happen to others, and are scarcely amongst the possibilities with you.

Each young man starts out on a different basis. One may be starting on a farm of his own, given to him by his father, well stocked and provided with implements. These young men who have so fair a start are very often the ones to make shipwrecks. Such a one is apt to be carried away with the idea that farm life is an Eldorado, a life of ease and elegence in which he will have nothing to do but drive around in his covered buggy, have a good time and boss the job The money that to him was so easily acquired very easily slips through his fingers, and in a few years from the time he started he is applying to his parents for more help, or, if he is ashamed to do that, he borrows in the bank and then in a very few years more the crash comes.

Then there are other young men who have bought their farms, who, making haste to become land owners have placed mortgages on the farms, the interest of which is a heavy rent. This is just where some young farmers make their first mistake. Better rent a farm than own one heavily mortgaged. Do not make too much haste to be a land holder, and on no consideration mortgage your farm to purchase luxuries which you can do without by practising a little self-denial. From a tolerably reliable authority I have obtained the information that only twenty per cent. of the mortgages placed on farms in Canada are redeemed. There is nothing drags like a mortgage.

Then there are young men who have rented farms at a reasonable rent, and have purchased stock and implements for which they have paid cash. All classes are somewhat differently circumstanced, but yet whatever basis you start on your success as a farmer depends very largely on yourself and your wife. The farmer's wife by her economy and forethought has no small share in the upbuilding of her husband's fortune. Both husband and wife are active partners in the firm of "my wife and I." Your gains are one. Your interests and your losses are one. The young farmer ought to choose a wife who is in sympathy with him in his vocation; then there will be four hands to fight the battles, four eyes to watch for the dangers, and four shoulders to carry the burdens.

Unless you set out from the first with a firm determination to succeed you will not accomplish much, and having so set out you will soon find that life means earnest work—work that cannot be done by the wife with her finger-tips nor by the husband with his hands in his pockets. I think that sometimes the farmer's wife fails to do her part thoroughly from lack of competent help and also from a lack of knowledge more than from carelessness. We train our doctors, lawyers and ministers for the work they are expected to do. Why not train our sons and daughters to be farmers and farmers' wives. This is an age when education is coming to the front—when men and women are interesting themselves in the education of the masses. Sometimes I wonder if the prophet Isaiah was looking down through the intervening years and speaking of our day when he said, "And wisdom and knowledge shall be the stability of thy times." I would not for a moment speak disparagingly of a literary education for our daughters, nor of a musical education, or a course in arts, but along with these there should be a thorough education in domestic economy. We should instil into the minds of our daughters the fact of the respectability of labor; that to sweep and churn and bake is just as respectable as to play the piano or paint a picture, or speak in three or four different languages; and that to mend the clothes and darn the stockings neatly is a more useful accomplishment than to be able to work with symmetry and swiftness the up-to date embroidery stitches.

If you are going to succeed you must learn to say "no." The occasions on which you will have to use that word, and use it emphatically, are many and varied; I mention only a few. One is when your friend comes to your home, makes himself wonderfully agreeable, speaks flatteringly of your skill as a farmer, praises your wife's delicious butter and home-made bread, and then asks, very meekly of course, if you can lend him a little money, "a mere trifle, you know," of fifty or one hundred dollars or so. He will give you his note and of course it will be all right, etc. It may be all right and it may not, and even if you have the spare cash you had better say "no" Then when some neighbor, it may be, and a first-rate fellow, asks you to do the favor of endorsing his note, it seems hard, almost unkind, to refuse a neighbor, but you had better do so. For some time to come you will have quite as much as you can manage to attend to your own affairs without burdening yourself with the affairs of others. I will mention just one other occasion when an empathic "no" should be said. When the indefatigable agent calls at your door—it may be some day about noon, so that he will find you in, besides giving you the pleasure of his company to dinner—offering for sale some article which, though it may be good in itself, to you, as a farmer, is utterly useless When he takes up your precious time descanting on its merits and the blessings and benefits accruing from its possession, don't be persuaded by him. Just say "no" and go to work. Very few young farmers just starting in life can afford to buy things they have no use for; to them it is equivalent to so much money thrown away.

Start out in life with a fixed determination to keep out of debt. If you do this you will soon find that life is not only earnest work but economy and self-denial. You may be the son of a well to-do farmer and your wife the daughter of a well-to-do farmer, and, if so, no doubt both of you have been accustomed to many little trifles in the way of ornamentation and perhaps luxuries which are beyond your reach, now that you are in your own home, unless you go in debt to obtain them. Do not do so under any consideration. Your fathers and mothers practised economy and self-denial in their younger days, and now they are enjoying in their old age their well-earned comforts. Do not expect them to provide you with luxuries and be constantly harping to them about how you miss this and that, and hang round waiting to see if the mantle of their success, or at least some shreds of it, might once more fall upon your shoulders, or to try by some cunning manœuvring to induce another slice from the parental loaf to drop into your hands. They have started you in life once—let that suffice. From this time forth let the world see that you are a man. Launch out into the world and fight your own battles ; be willing to begin as your father and mother began, and be contented with such things as you can afford. I know that the work which you have to do know, both in doors and out, is vastly different from the work of your grandparents ; but, if you would succeed, the principle upon which you must work is essentially the same. While rapid progress has been made during the last fifty years in art, literature, and notably in electricity, the searchlight of science has also been thrown on agriculture, and it, too, has joined in the onward march ; many things have been made clear to us upon which the light was only dawning in their day. The inventions and improvements of the nineteenth century have given to you and your wife many advantages over your grandparents, and yet in spite of difficulties, such as you will never have to contend with, they prospered. How did they achieve their success? By untiring industry, by economy and self-denial, being willing to do without many comforts they had been accustomed to in their homes across the broad Atlantic, by keeping out of debt, by being sober and honest, and by courageously facing all their difficulties with purpose and will. Looking down through the years that have passed, and thinking of the comforts that we, many of us, enjoy because they have lived and worked, we cannot but say, all honor to those noble men and women, the heroes and heroines of our land and century. They have been largely influential in making our country what it is to-day, and passing away they leave to us an heritage of which we are justly proud. These men and women are no myths, existing only in imagination ; some of the younger of those pioneers are still with us, old men now, connecting links between the present and the past ; men who, fifty or sixty years ago, started at the very most with a few pounds sterling and have steadily worked their way until now they are men of means in our land.

In starting out on your farm you must, of course, have some stock and implements, and furniture. Take care that your outlay is within your means. Do not go into debt for things that you or your wife imagines you need just because Mrs. So and-so has them, or because you have been used to them at home. As little by little you add to your savings you will be justified in adding to your comforts. Did you ever notice that it is the wealth that we gain little by little that usually stays with us, while that which comes to us easily usually vanishes with uncomfortable rapidity. Then, having made your purchases, take care of your possessions. Don't leave your implements in the field to bleach in the winter storms ; don't leave your grain bags lying about for the mice to gnaw ; and you, young wives, don't leave the milk standing till sour before you put it away, and don't leave the kettle to boil dry on the stove and perhaps have the spout melted out while you are reading a trashy serial and probably shedding tears over the imaginary trials of the heroine. There is enough real sorrow in the world to weep over, if weep you must, and had you attended to your work you might have saved the money you will have to pay to get the kettle mended ; and there is just a possibility that your next churning of butter may not command so high a price as it would have done had the milk been properly cared for, so that altogether your loss may amount to quite a little sum. Only a trifle, I fancy I hear you say. Well, trifles are not to be despised. It is the little leaks that sink the ship. One cent saved every day and put out at interest at six per cent. will in fifty years amount to $950.00. There is scarcely any such thing as a trifle. Economy, and more particularly economy in little things, may be said to be the guardian of property—a good genius whose presence guides the footsteps of every prosperous and successful man. As far as domestic economy is concerned we do not consider it at all out of place to rank it amongst the fine arts. There are some wives who make mistakes in their household management. They want to save and be economical, but don't know how. Then again a great many people mistake stinginess and meanness for true economy, when in reality it forms no part of it. One mistake that is frequently made is in the preparation of food. It is always good economy to take care of our health to be properly fed and comfortably clad. We should spread upon our table a generous diet. When I say that I do not mean to advocate extravagance, but mean that there should be a sufficient supply of well-cooked nourishing food provided for the wants of the family ; such a provision is not extravagance. It might in the long run cost a much larger sum to recuperate the health after it has been impaired by the lack of proper nourishment and clothing than it would to provide nourishing food and comfortable clothing. In the matter of dress many make mistakes by supposing that the cheapest goods are the most economical, which is not the case, because good material will last so much longer and wear so much better than poor that the difference in price is soon made up. We have heard some women boast of how much they have saved by the purchase of an inferior article, when in fact they will lose by it, as they will in all probability need two suits instead of one during the season. Then as regards home dresses, they need not be expensive, but should be clean and neat. Do not, under a mistaken idea that you are practising economy, slouch around the house in an untidy slipshod manner during the six working days of the week in order to be able to don a gaudy Sunday gown which, very often, is neither appropriate nor becoming.

Keep a strict account of your receipts and expenditures both on the farm and in the house, so that you can see at once just how your affairs stand. Never buy things that you do not need ; they are dear at any price. We have known women who could not resist the temptation to buy pretty ribbons, remnants of silk, and other similar articles. These things were of no use either to themselves or to their families, and they were foolish enough to buy them on credit, too. And there are men who seem to have a mania for bidding on job lots and antiquated horses at auction sales until their yards become homes for incurable implements and the stable a home for the aged and infirm. The money paid for such things is usually money thrown away. Very often, if you visit the homes of those people you will find them untidy and uninviting, and they tell you—and think they told you truly—that they cannot afford to have things like other people, when all the time they might have been much more comfortable than they are had they spent their money judiciously. Try to exercise good judgment in making your purchases. Try to form a correct idea of the fitness of things. Don't spend your money on ribbons and gewgaws for either yourself or your children, which can be done without, while all the time you are in need of useful clothing which, under the mistaken idea that you are practising economy, you are doing without. This kind of management is not along the line of making a fortune.

Then let there be a thorough understanding between husband and wife on financial matters. The wife should be the husband's confidant in all things. A good, frugal, honest, sensible wife is the best help a man can have, as step by step they travel together on the road that is to bring them to a comfortable old age. When difficulties present themselves and obstacles rise up before you, do not, as Talmage says "try to look them out of countenance through the bottom of a tumbler," but go to work bravely and overcome them. Establish your home on Christian and temperance principles. You have youth and health and strength in your favor ; put away all softness and vascilation. Be manly men and womanly women ; others' estimate of you will be largely influenced by your own estimate of yourself. Fight your own battles ; mind your own business ; pay your own way. Do this and I have no doubt that you will ultimately succeed in at last gaining a competence, and will, in your turn, as your fathers and mothers do now, enjoy in your old age the fruits of toil.

Do not infer from what I have said in this paper that I think that farmers should not enjoy comforts and luxuries. On the contrary I think that nothing is too good for the farmers, especially for those that have worked hard in their younger days. Neither do I think it is wrong for them to enjoy life, provided they always keep within the limit of their means and lay up something for their declining years.

ECONOMIC HOUSEKEEPING.

By Miss Laura Rose, Lady Instructor in Dairying, Ontario Agricultural College.

Are the hours just as long as they used to be in the days of our grandmother, when the soap, the sugar, the candles, the yarn, the flannel and the cloth were all of home manufacture, while the knitted counterpanes and very much quilted quilts, now handed down as monuments of industry, denote that even some leisure hours were left for lighter work?

It does seem in this age of ceaseless activity that to accomplish but a part of what one would like to do, it is often necessary "to make the night joint laborer with the day."

The cry on all sides seems to be "I haven't any time, I'm so busy." Surely something must be wrong, and if wrong, then surely there is some remedy; and it likely lies in the saying "plainer living and higher thinking."

The majority of us spend far too much time and thought on dress. We have become willing slaves of Dame Fashion. When she demanded that each sleeve should resemble a minature balloon, we began at once to contrive how we could stretch our cloth to the required dimensions. Now the same fickle dame says the sleeves shall be small, and without a murmur or delay we take them out and cut them down. Instead of ridiculing a woman for looking old-fashioned we should admire the strength of character which enables her to wear her dresses so long as they are tidy and respectable. Think of the time and worry she has spared herself. Let us as women hasten the day when more common sense and personal comfort will be displayed in our wearing apparel.

The houses built now-a-days are so large and so overcrowded with fancy furniture and bric-a-brac that the care of keeping in order such an establishment is more than the ordinary-strengthed woman can see to, and more especially as each year seems to make it harder to secure competent domestic help, and just here may I say a word on that much discussed theme: so long as housework as an occupation is looked on in its present light both by mistress and maid, just so long will the girls go to the shop and factory, instead of into a home where the work would be no harder and certainly more healthful, and the remuneration in the end just as great, or at least it should be. A girl, to be a stenographer, must attend a business college; to be a dressmaker, must serve a term at a dressmaking establishment; to be a school teacher, must spend years at hard study; but to be a *housekeeper*, where the work is vastly more varied and complicated, no special training whatever is deemed necessary, and the poor girl has to learn as best she can the hundred and one things expected of her. I know of one poor girl, and my heart ached for her, who had lost her mother when quite young and was compelled to leave home and earn her own living. She went from house to house only to be soon got rid of because she was no good and did not know how to do anything. The discouraged girl, crying, said "How can I help it, I never had anyone to teach me." I think many years will not roll round before we shall have established throughout our land thoroughly equipped schools, where domestic science in all its various branches shall be taught. The increased health and happiness such training schools would bring to the people of our country would amply repay the Government for any outlay it might make. I have heard it said that bad cooking and ill-managed homes give rise to more divorces and suicides than any other cause. I have noticed that a man will put up with a great deal if he has plenty of well-cooked food and a comfortable bed.

But to return to the large houses I was speaking about. The gratifying of one luxury breeds another, and each one brings with it additional work and responsibility. If we could content ourselves with homely (I like that word taken in its true sense,) comforts and not keep constantly comparing and trying to keep in step with our rich neighbors across the road, life would be the pleasure our Creator intended it should be.

Ambition rightly directed is a commendable thing, but when it leads into all kinds of uncalled for extravagances it is to be curbed lest it lead to a sudden downfall.

We should economize our strength, and perhaps the most successful way of doing that is to have method in our work It grieves me, as I move about among the people, to see the wasted time, the unnecessary steps taken, the ill-temper created, and the constant general confusion caused just for lack of method and order. "A place for everything and everything in its place," is an old adage, but one which should be established in every home, and one which would dispel—as the morning sun the fog—the constantly rising domestic clouds. Have pegs to hang the boys' hats on and see to it that they hang them there. I mention this, as three times a day there is usually a hunt for Johnny's hat.

Then in the kitchen everything should be as convenient as possible. That reminds me of an old Scotch family I knew who had to have the oaken tea caddy stand on a certain table in the sitting room. Each time tea was steeped the teapot was carried from the kitchen. through the dining room, across the hall to the caddy on the table in the sitting room. I like a kitchen to be clean and tidy, but many women lose the idea that it is their workshop and so think that every pot and pan should be hid from sight and very often in the most out of the way unhandy places, which, when the articles are needed, take time and strength to bring them forth. They say it only takes a minute, so it does, but it is the wee minutes added together that make hours, and it is often the unnecessary steps added together which make the feet tired and the work too heavy. It really is not the big things but "the little things in life which are causing all the strife."

I am quite in love with the kitchen cabinet tables. In them is a place for everything needful in baking, and having everything at arm's length much time and energy is saved. Another convenience—yea, even a luxury—is a high stool to sit on when peeling potatoes, drying the dishes, or even when ironing. If you think it lazy to do so, get rid of the idea ; there is plenty of work at which you are compelled to stand, so learn to husband your strength whenever you can. There are many little appliances for saving labor and time I would like to mention, but space forbids.

Of all the homes in the land the larder in a farm house should be the best provided for, but whether from ignorance of the culinary art, or that the best is frequently sent to market, the fact remains that many tables in the country lack the tasty, nutritious dishes that should be found on them.

In the first place not one farmer out of five puts in a good vegetable garden, and not one woman out of ten makes good use of what is in the garden. There is nothing so wholesome, so cheap, or so appetitizing as freshly-gathered, properly-cooked vegetables, and there should be at least one variety besides potatoes on every dinner table. A garden takes time, but it doubly pays for itself in giving health, pleasure and profit.

Better to have a small one well cultivated than a large one neglected. Do not confine yourself to vegetables alone, but have plenty of small fruit and some flowers. I would urge all to try a small strawberry patch. They are easy of cultivation, soon come into fruit, and are such a treat in the early summer, especially when plenty of cream can be had with them. No spot in our garden gives such rich returns as our little corner of strawberry vines.

Of all the branches in cooking, perhaps that of meats is the least understood and most badly done, or I might more properly say over-done. There are so many reliable cook books, and so much information given in journals, that there is little excuse for grieviously erring in this line.

Farmers should not depend so fully upon pork as their chief meat diet, but should contrive to have more fresh meat and fowl. On the majority of farms milk is not utilized as it should be to make pudding, custards, etc., to take the place of the rich pastries and sweet sauces, which are less nutritious and harder to digest. Especially should the growing members of the family be encouraged to take plenty of milk. The housewife should learn to plan and arrange her work for at least a day ahead. When she is preparing the tomatoes for dinner, let her think to cook a few more than is required for that meal. Then at supper time a delicious soup can be made of what is left, and how the hungry school children, who have had a cold lunch dinner, will enjoy it. Is enough thought given to the little ones, whose very appetites seem ample excuse that anything is good enough for them?

A farm should, to a great degree, be self-supporting; by that I mean it should endeavor to produce as much as possible of what is consumed on it. You do not like to have to buy feed for your horses or hay for your cows. It does not seem to pay to do so, yet I know farms where the bread, butter, meat and even the eggs are bought, and it does not appear to be from lack of help either. I heard of one farmer with a small family on a hundred acre farm, who last fall had to pay a store bill of $600.00, and yet, as the person who told me said, "this household never seemed well dressed or particularly well fed, although they had lemon pies and a lot of clap-trap three times a day, but the substantial healthy food seemed to be lacking."

What we are all sorely in need of is more knowledge how to live; then the question of means would not be such a serious one.

I have spoken of the lack found, but I must in conclusion bear testimony to the many thrifty, economical and splendidly managed farm homes scattered over our country—homes which cannot be excelled in point of comfort and convenience on any part of the globe.

It is the children coming from such homes who are going to make Canada lead the world, for in no land has the agriculturist such resources and opportunities as in this free, fair Dominion.

A TALK ON DOMESTIC ECONOMY.

By Mrs. J. L. Smith, Whitby, Ont.

I wonder why neighbor so and so seems to get along so much better than we do, has been the mental query of many a discouraged housewife as she has watched her neighbor drive past to market. I don't see what she has to sell this hot weather; how she manages to make any butter is more than I can tell. Well, we answer, most likely the reason why she succeeds is because she economizes and does things in the right way and in the right time. And don't I economize? I fancy I hear you say. Well that is a question. There are hundreds of housekeepers who think they are economical and are mistaken; they lack judgment and don't know how to economize. What they save on one thing they spend on another. They will go without some article which they really need in order to purchase some other article which they do not need, and call this practising economy. The old adage about being "penny wise and pound foolish" is often applicable to those who think themselves saving. Economy is something more than a saving; it is foresight and tact. It is insight into the philosophy of little things, so that we can, out of what seems almost nothing, make something which will either nourish the body, please the eye, or in some other way contribute to our comfort or happiness.

Some appear to have a natural gift for house work; they have tact and skill, and love their homes and their work. They have the faculty of having their houses neat and attractive with inexpensive articles, while others are constantly harping about its drugery and chafe at every turn and grumble at the hateful necessity which causes them to go through such an uninteresting routine of work, and, because they have not Irish point curtains and velvet carpets at their disposal, they appear to think it is not worth while the time and trouble and the tax on their ingenuity to make their rooms look cheerful and pretty with less costly drapery. Women who have never tried have no idea what can be done in the way of home decoration with very simple and inexpensive materials.

Just at present there seems to be among some (especially the younger) women whose activities are confined to the domestic circle, a restlessness and discontent caused probably in some cases by the (to them) unfavorable comparison between themselves and some other women who are engaged in the professions which were formerly open only to men. For this restless and discontent there surely ought to be some remedy ; and such remedy we think is to be found in the correct valuation of domestic labor by those engaged in it. Housework is not degrading. It is not unfitting any lady. The work enclosed within the four walls of your kitchen is just as honorable as that which is found outside of them. The good economical house keeper is worthy of all honor, and if she could only be convinced of the dignity and importance of her work and her own social standing, the world, which is apt to accept our own valuation of ourselves, would soon acknowledge it also.

While it never was and never will be right and wise to be extravagent, yet perhaps there never was a time when the necessity to economize in the farmer's household was so urgent as now. If the young farmer would make a competence his efforts must be seconded by his wife in her household management. She should so arrange her work that she economizes not only time and material but also her own strength. While I have no doubt but that through the length and breadth of our land there are in our rural homes many really overworked women, yet at the same time I am of opinion that there are many who break down before the battles of life are half over, when, if they had husbanded their strength as they might many times have done they would have been strong and well for many years. Those people are usually fussy people who are always busy and yet never accomplish much. They keep themselves busy by the awkward way in which they go about their work, not having the faculty of taking hold of things the right way or beginning at the beginning and thus saving trouble, annoyance and material (in some cases), and also their own strength. An Irish mason was once asked how he would build a chimney, when he answered " Sure now and that itself is an aisy thing to do, just lie down the top brick and then lift it up and put the next one undernaith." It is just so with some house-keepers, they begin at the wrong end of their work and then they wonder why things don't go right. If some of our younger house-keepers, instead of spending their time grumbling because they have their work to do, would study how to do it in the best and most expeditious manner, even those of the most desultory habits might with persistent effort acquire some tact, neatness and deftness, as well as system and method in doing their work, which would well repay them for their trouble. There is a great economy of time in having all things " in order stored." When once you have gone through the house and have everything nicely arranged, and clean and neat, it requires but little time and labor every day to keep it so.

It is impossible, on account of the varying circumstances of families, to lay down any fixed rule for doing work, but every house-keeper should make a time-table of her own to suit her own particular circumstances. There is more rest for the house-wife and less waste when the work is planned and those plans carried out as far as circumstances will permit, than when we rush around doing first a little of one thing and then a little of another in a hap-hazard sort of way and never quite finishing anything. It is not wise to have too many irons in the fire. The faculty of making the most of everything, of making a little go a long way, and of never being hurried, but having things always in order, are the chief requisities of a house-keeper. If the family is not very large, a good smart house-keeper, who keeps, say from four to six cows and between thirty and forty hens, should, with the proceeds, not only keep the family in groceries but also provide considerable of the clothing and household linen as well, so that there is no store bill for the husband to pay after he sells his grain. Not long ago I was talking with a lady with whom I am well acquainted, on the subject of domestic economy, when she told me that from the product of five cows and between thirty and forty hens she purchases all the clothing for herself, her husband, and two children, provides all the household linen and all the family groceries for a family of five (she boards the hired man) besides occasionally taking an outing, and, she added, I have often a surplus—at present I have twenty dollars. There is nothing scrimped or near about her housekeeping ; their wants are all supplied, and her table is spread with good nourishing food. But there is no negligence or waste; there is no soft, unsaleable butter—everything is in order. The milk pans are scoured and scalded, the cellar is clean, cool and airy, and the best of judgment is used in the purchases made.

There is often considerable wasted in the indiscreet purchases, as, for instance, in buying too much of some kinds of groceries or meat and consequently having some become unfit for use. Some use very poor judgment in the purchase of dress goods and millinery by buying expensive and perishable articles, which, after being worn a few times, become faded and flimsy. Tawdry finery is never becoming. A neat, well made dress, of some good, serviceable material is much more suitable and looks much better. There is often great waste in using kitchen utensils, etc., for purposes for which they were never intended and for which they are entirely unfit; and in the careless washing and drying of cutlery, tins and kettles, which cause them to rust and very often they last but half the time they would have done had they been always properly taken care of.

But perhaps the greatest lack of economy in the kitchen is in cooking, and this is not always accounted for by carlessness. Very often it is the result of a lack of knowledge on the part of the house-keeper, who is often ignorant of the relative value of the different kinds of food as to nutriment. The questions of "what shall we eat and how shall it be cooked?" are pertinent ones. Edward Atkinson says that "half the struggle for life is a struggle for food," and it is deplorable that through ignorance either in the purchase or preparation, or both, of this food, a considerable portion of the earnings of the bread winner is wasted. What the house-keeper should aim at as regards food is to provide that which is the most nutritious and healthful and will best repair the waste of the system.

As knowledge advances and our experiences multiply we begin to realize that the human body needs care. Bishop Foster says "if we would care for men's souls most effectually we must care for their bodies also." Not only our health and strength alone but also our intellectual life—I think it is not going too far to say our morals also—depends very largely upon the care we take of our bodies. The food we eat forms a very important factor in our strength of muscle or brain, and more or less work will be done according to the amount of nutriment received. In the past there has been but little attention paid, especially in our rural districts, to economy in food. With many of our house-keepers in the country there seems to be a prejudice against it. Probably fearing that the epithet of stingy or mean may be applied to them by their neighbors, they are apt to load their tables with a bewildering variety of layer cakes, pies (too often with heavy indigestible crusts) ginger-bread, trifle and knick-knacks, and think when they are doing so that they are providing well for the wants of the family. And then they wonder how it is that their boys don't seem strong and healthy like other boys, and why their girls lack the buoyancy and bloom of their young companions, and why the physician has to be called in every little while to prescribe for some member of the family, when if they had provided good, wholesome, well cooked food, which contained a large proportion of nutriment, they would have seen the results they desired without the assistance of the family physician being so frequently required. More than half the ills that flesh is heir to might be nipped in the bud by a skilful cook, and doctors' professional calls would be in a large measure dispensed with.

Different individuals differ so widely in the amount and kind of food which they require that it is very difficult to lay down rules to regulate diet. The old adage that "what is one man's meat is another man's poison" almost amounts to a truism. But dealing with the subject in a general way we are safe in saying that the most healthful food is that which is best fitted for the wants of the user; that the cheapest food is that which furnishes the most nutriment at the least cost, and undoubtedly the most economic food is that which is both the most healthful and the cheapest. Those foods which are the best adapted for the building up of the tissues of the body are those which contain a considerable amount of protein and in general, animal food contains the most. A pound of cheese contains 0.28 pounds of protein, while a pound of milk only 0.04 lbs. of protein. Lean meats and fish produce protein in large quantities. For the generality of people in good health, meats, fish, eggs, milk, butter, cheese, sugar, flour, meal, potatoes and other vegetables make a suitable diet. In order to ascertain what food materials are most economical we must take into consideration both their composition and their price. Ver often we practise poor economy in buying high priced foods which we really cannot affor and in many cases they are not the most nutritive. The maxim that the "best is th cheapest" does not always apply to food. It frequently happens that the food which i best suited to the wants of the consumer is that which can be obtained at a small cost While every farmer's table should contain the best and most nutritious foods, very fev can afford to pay a fancy price for delicacies. Expensive food materials are somethin like expensive articles of adornment "very nice if you can afford them" but not economical. The waste of the body must be supplied or else there will be loss of energy, but t be truly economical this waste must be supplied at the least possible cost, that is, the mos nutritious food which is not always the most expensive, should be used, and it should b cooked in such a way as to retain its nutriment juices. This is most easily accomplishe by roasting; broiling ranks next, then boiling and lastly frying. Meats should as far a possible be cooked in their own juices and a great many people follow the same rule wit some kinds of vegetables. While it is most healthful and hence most economical to use variety of meats, yet it is neither necessary nor economical to have a great variety at th same meal. From the list of food materials in general use which I have already mentioned, a great number of appetizing and nutritious dishes can be prepared by a good careful cook, but by poor cooking the best of food often loses half or more than half its nutr ment. A well cooked, well arranged meal and a tidy kitchen are the best evidences of well kept home.

To be a good cook requires care and attention in every particular, even in the management of your range. Time was when fuel economy was scarcely considered worth thought in our farm houses, but now, in the frontier counties at least, matters are quit changed in that respect. A careful housekeeper not only knows to a trifle how muc wood or coal it requires to heat the oven to a certain temperature but she never allow the fire to burn out and the oven begin to cool while she stands with her arms akimb gossiping to a neighbor who has come in to borrow something and who is in no particula hurry home. The good cook wastes nothing either in fuel or material. She has th faculty of making tasty dishes out of very little. The trimmings and ribs cut from th roast, the cold stake or the cold egg that was left at breakfast are all utilized in som way and made to do duty in the preparation of another meal.

It really, however, requires more skill to cook a good plain dinner than to make wha is known to cooks as a "made dish." It is said that the number of those who can b trusted to boil an egg are surprisingly few. The best plain cook is also the one who ca manufacture the best made dishes, as an inferior cook is apt to disguise the ingredients o which it is composed with seasonings, and they are quite beyond recognition. Regarding this subject of made dishes I am reminded of the experiences of an Englishman wh while travelling in China called at a restaurant. By various sounds and motions h succeeded in making the Chinaman understand that he wanted a meal. In due time i was served and he supposed from its taste that it consisted chiefly of duck but anxious t know whether it did or not he said to the waiter "Quack! Quack!" meaning, is thi duck? I imagine his horor and disgust when the Chinaman gravely shook his head an replied "bow-wow," meaning dog. While everything in the way of scraps, bones, etc which is good and fit for food should be used, yet very highly seasoned dishes are no healthful and consequently not economical.

Although there may not have been so marked a progress in the cooking departmen as in some other branches of home life, and although reform in methods of cooking seem to be one of the economic demands of the day, yet I believe that a great number, perhap the majority of our farmers' wives and daughters desire to be good cooks, and year b year there is an increasing spirit of enquiry abroad on this subject and it is receivin intelligent consideration from many who at one time thought themselves adepts in th art. Many of our rural housekeepers who are anxious to save as much as possible o their hard earnings and to succeed in their calling realize that they must make the mos of everything in every department of their work. They realize too, that they have n drank the cup of knowledge in the art of domesticity to the dregs, but that there is som thing yet to learn. Some who without any scientific training have been taking lessons in the school of practical experience (which is an excellent school master) have attained considerable proficiency in the art of economic housekeeping. Those are they who in general are the most anxious to press on and supplement their practical work by a course in domestic science and in this we have no doubt that others will soon join the ranks.

May we not hope that with the ushering in of a new century there may also be the ushering in of a new era in domestic economy in all its branches, when there will be no hap-hazard work with its consequent failures but when everything will be done on scientific principles. When a true estimate will be placed on all domestic labor and when the word " drudgery " will be erased from the kitchen vocabulary.

ECONOMIC HOUSEKEEPING ON THE FARM.

By Mrs. R. Rogers, Kinsale, Ont.

The word economy signifies the rule by which the house should be ordered, especially with reference to the relation between expenditure and income. If the former is kept well in subordination to the latter, the solution of the financial difficulty among farmers and others is not far from being solved. Economic housekeeping, as we understand the term, may be displayed in three separate ways: by limiting the number of wants; by preventing waste; and by the adjustment of forces in such a manner as to make a little represent a great deal. In the first place let us learn to limit our wants to those only which are necessary. A great many that at first seem to be such can be overcome by quietly ignoring them; they will disappear in time and may be followed by others just as urgent, which must be treated in precisely the same manner. Simply regard those wants only which our needs and our income will warrant us to supply, and we will be agreeably surprised at the fewness of their number, and that somehow we have gotten along without the host of things that we once thought so necessary to existence. So much of the farmer's success depends upon economic housekeeping that we deem it a subject worthy of very serious consideration, especially now when the farmer has to make the very most out of his resources and to economize on every hand to make the proverbial ends meet.

We may begin with economy in the kitchen, for here it must be used, if anywhere in the house, to prevent waste, for if waste there be in a household the kitchen is the most fruitful field for its operations. In all households the supplying of the table is necessarily one of the housekeeper's most important duties, and here, as perhaps nowhere else, can a great saving be accomplished by practising a little judicious economy, or a great waste be incurred by the lack of it. Some throw away or waste enough to keep an ordinary family throughout the entire season of unused pudding, dry bread, cake, cold meat, etc. If these were but tastily arranged and steamed, the cold meat sliced up and made into toothsome meat pies or stewed and served up with nicely made gravy and fried potatoes for the children's supper when they come home from school, they would be duly appreciated, and be much more economic and wholesome than so much of pie and cake or pastry of any sort. Another way to prevent waste of dry bread is to use it with soup, for which purpose it is better adapted than if it were new. Still another way is to make t into bread pudding for the wash day dinner, when the good housewife has little time or nclination for very elaborate preparation for the same. Thus, with a little skill and economy n the management of the table alone, a very great saving can be effected, and that, oo, without in any way stinting the daily supply, for plenty of good, wholesome, wellooked and nicely arranged food should always be found upon the farmer's table, as all inds of fresh vegetables in their season, with the various kinds of fruit, are or at least hould be, within the reach of every farmer who owns his own farm, and are an excellent ddition to every-day menu, as well as conducive to his better health, and if near to a ood market to his prosperity also. More can be, and often is, squandered upon extravagant knick-knacks for the table than many suppose possible until they have them to pay for; while good, well-cooked, though plainer and more substantial food would not only be more economic and wholesome but would require less work in preparing (a great consideration for the farmer's wife) and would also diminish very materially the size of the store bill which many have to face at the end of the year. Of course there are other sources of waste and extravagance besides that of the kitchen; we touched upon these simply because they are the most in evidence in everyday life; but we must see to it that every branch of our housekeeping is clear of the evil, as even a small leak will sink a great ship. It is true that "a woman can throw out more with a spoon than a man can bring in with a shovel." Extravagance and waste in the household management alone are no doubt responsible for many of the failures which farmers and others make; while on the other hand there are many thrifty housewives who by their industry and economy have added much to the yearly income of the farm, and thereby tided over many seasons of depression if not of actual failure. All honor to such noble ones! Would that their number were legion.

The economic adjustment of forces so as to make a little represent a great deal is of very great import in the management of all kinds of work, whether of the farmhouse or elsewhere, but especially is it adapted to "Economic Housekeeping on the Farm," for where there are so many and varied duties to perform within a given space of time, and so little outside help available to perform them, it is decidedly to our advantage to concentrate our forces and to reduce our field of labor to a minimum, That this may be accomplished to the best advantage it is absolutely necessary that system, or order, should prevail in every part of the household machinery. "Order is Heaven's first law," and should be also of every home. It is very essential to economy of time, labor and patience to have a time and place for everything about the house, while waste of time, which is ever coincident with unsystematic labor, may be avoided by having our work wisely planned and systematically performed. This also makes it easier and vastly more pleasant for the busy housewife. Far more work can be accomplished in less time and with less fatigue and discouragement than if disorder reigns throughout the house, besides the strain upon the energies and health of the oftentimes weary housewife being greatly diminished. The strangest part of it all is that not nearly all housekeepers can see this, nor that in allowing an untidy, slipshod, state of affairs to prevail in their house that they are making life harder and more dreary for themselves and for the household generally.

On the matter of economy in furnishing the farmer's home little need be said, other than that nothing should be bought but that which we are reasonably sure we are able to pay for. What would be extravagant for one farmer to buy might be all right for another who could well afford it. The same may be said of dress and other articles, but an adaptability to the purpose for which it is required and a price well within our means should be considered before a purchase is made. An instance of real extravagance is here recalled to mind where the wife of a young farmer in very moderate circumstances, thinking that she must keep up with the prevailing fashion, hired a seamstress to make clothing for herself and little daughter not yet five years of age, paying a high price for braiding, frilling and tucking a number of dresses, pinafores and other articles, which she could have made herself had she been so inclined and been contented with less style. Plainer made and less expensive clothing would have been better suited to her needs, and her husband might still have owned his little farm and been prosperous but for her endless extravagance in dress and other household matters. Afterwards she and her daughter had to earn their living as best they could, and *did* manage to live without frills.

It is said that times are hard. So they are for some. Many complain that they find it almost impossible to make anything more than a living. And others that they cannot even do that. This all may be very true, but it is true also that times are made harder and the difficulty increased in many cases by a sad lack of economy in connection with those items in the accounts which may be termed household expenses. Times are also made harder in some cases by a lack of tact in managing the affairs of the farm both indoors and out; and until we find where the leak is and apply the proper remedy we may expect to suffer in consequence thereof.

ECONOMY IN THE HOME.

By Miss E. Nash, Stoney Creek, Ont.

To be successful economizers in our homes we must first learn the true value of the economy of time. It is a common saying that time is money, but it is also a great deal truer that it is opportunity, skill, ability, and character, and that to waste time is to waste life itself, with all it holds in store. It is not only the idler who wastes her time, it is often the busy woman whose only idea of its true management is an increasing rapidity of action. Now, rapidity is an excellent thing in its own allotted sphere, but, outside of that and unguided by wisdom, it may become not only useless but prejudicial. Very much of the inferior work of our homes and many of its most disheartening failures are due to this cause. On the other hand, the woman who has learned the art of economizing her time knows that she must not stint in the period required for preparation. When she begins her work, therefore, she is ready for it; a state to which many never attain. She knows just what she has to do and how to do it, and need not waste precious time in vain experiments. Beginning thus intelligently, and gaining fresh experience from every effort, she is able to arrange her work with system and method, giving to each part its due attention. One who is thus mistress of the situation acquires a calmness of mind which is most essential. Some have by nature more of this quality—this capacity for arrangement—than others, but even those who are lacking could cultivate something of it.

The work of those who manage the home has to do with food and clothing, with pure air and cleanliness, with health and sickness, with earning and spending and saving. Frugality and economy are home virtues without which no household can prosper. Dr. Johnson says: "Frugality may be termed the daughter of prudence, the sister of temperance, and the parent of liberty. He that is extravagant will quickly become poor, and poverty will enforce dependance and invite corruption." The necessity of practising economy should be evident to everyone, whether in the possession of an income no more than sufficient for a family's requirements or of a large fortune which put financial adversity out of the question. We must always remember that to manage a little well is a great merit in house keeping, for those who can manage a little well are most likely to succeed in larger matters. Economy and frugality must never, however, be allowed to degenerate into parsimony and meanness. As a well provided table brings to us healthy bodies and sunny tempers, it should be one of our chief aims to make our food healthful as well as appetizing. Physiologists who study the uses of every part of the body have found that one kind of food alone will not support life except for a short time. It has also been ascertained that each particular kind of work in the body can be done best by a special kind of food. As, therefore, there are three chief duties to be attended to in the body, so there are three particular kinds of food, each named according to the work it has to do. These are: First, warmth-giving foods. The foods best adapted to create warmth are those which contain starch, fat and sugar. They have been called carbonaceous compounds, "heat givers" and "force producers." Second, flesh-forming foods. The foods which make flesh and give strength are those which contain albumen, fibrine, gluten and casein. They have been called nitrogenous compounds and "flesh-formers." Third, bone-making foods. The bone making materials are found in the mineral properties of water, in common salt, in certain soda-like ashes found in vegetables and fresh fruits. The model food for a day has been thus given:

1. Carbonaceous food	Starch,	12 ounces.
	Fat,	1 ounce.
2. Nitrogenous food		2¼ ounces.
3. Mineral matter		¼ ounce.
4. Combined with water		22 ounces.
Total		37½ ounces.

Any kind of food taken in excess does mischief. It cannot be used by the body, and either remains to cause pain and disease or is thrown off by sickness and various eruptions of the skin.

In connection with other items it is a most excellent plan, and is ever necessary in economy, to have accounts in housekeeping, which should be kept punctually and precisely. We would recommend a daily diary, entering the amount paid on each particular day, be it ever so small. Then at the end of each week or month let these various payments be arranged under their specific heads of butcher, baker, etc., and thus will be seen the proportions paid to each tradesman and any week's or month's expenses may be contrasted with another. The housekeeping account should be balanced not less than once a month—once a week is better—and it should be seen that the money in hand tallies with the account. Judge Haliburton never wrote truer words than when he said: "No man is rich whose expenditure exceeds his means and no one is poor whose incomings exceed his outgoings." Thus do we economize in time, health and expenditure.

On the important subject of dress the quaint Fuller observes: "The good wife is none of your dainty dames who love to appear in a variety of suits every day new, as if a gown, like a stratagem in war, were to be used but once. But our good wife sets up a sail according to the keel of her husband's estate, and if of high parentage she does not so remember what she was by birth that she forgets what she is by match." Our thoughtful woman of to-day seek neatness and simplicity rather than display. In purchasing apparel for her own wear the mistress of a household has to consider—after the important fact of the length of the purse—that these garments should be those befitting a matron and suited to her requirements. True economy also recognizes the limits of human endurance, and the varied needs of human nature. It is a most short-sighted policy that sacrifices the health and well-being of the worker to the supposed good of the work. The mother who denies her mind and body the rest and recreation they require, for the sake of her children, sacrifices their best interests. From well-managed homes go forth happy, healthy, wise and good men and women to fill every position in the world.

The wisest man thus speaks of a good home manager: "She bringeth food from afar; she giveth meat to her household; she seeketh wool and flax, and worketh willingly with her hands; she is not afraid of snow, for her household they are clothed; she looketh well to their ways; her children rise up and call her blessed; her household praiseth her, she will do good and not evil all the day's of her life."

PIN MONEY ON THE FARM.

By Mrs. R. Rogers, Kinsale, Ont.

There are very few subjects which are more interesting or engrossing to the mind of the average farmer's wife and family than that which is termed "Pin Money." Money, whether for pins or provisions, is now-a-days getting to be almost an unknown quantity in not only many farmers' families, but in others as well; and the house-wife who, by raking up the fertility of her brain, can devise any scheme however profitable for making money, is indeed a heroine. We read of a gifted woman who tried to earn some pin-money by writing a story about a Nanny Goat, and did actually receive for it the sum of twenty-five dollars; and being so successful with her first venture in literature, her mental vision at once conjured up a glowing picture of the future with the piles of pin-money pouring in upon her "promiskus like." So she tried again and again to please the various publishers with another story, Nanny Goat and otherwise, but alas! she could not get so much as fifty cents for the whole batch of them. Evidently they had had enough Nanny Goat and were now craving for some more palatable or digestible condiment. She then tried writing poetry on subjects various and enticing, from the "Baby's First Tooth" to "Beautiful Spring," and "Winter's Cold and Chilly Breeze," but no such articles were just then in demand, and she began to think this was a cold and chilly world for those who wrote stories and manufactured verses. Then as the necessities of the times pressed upon her mind she began like a sensible woman to look about her to see what the world *did* want. She very soon saw that there was much need for something more substantial than poetry, or prose either. So instead of tuning her lyre to the rhythm of the "Wintry Winds," she turned her attention to the less poetical, but more profitable, subject of raising poultry for the market. She purchased an incubator and "set" all the fresh eggs she could find, buying enough more to fill up and satisfy her wooden hen; then patiently awaited for her chicks to appear. She also raised ducks, geese and turkeys by the dozen, and sold them all at the best market she could reach. Her hens being relieved of the trouble of hatching chickens, repaid her by keeping her egg basket well filled. Some of them paying the penalty of a few days solitary confinement in a dark coop for presuming to infringe upon the business rights of her incubator. As she had read up all she could find on the chicken subject in "Farming," and other good farmers' periodicals, she learned to make poultry-raising pay and soon had her incubator paid for, the market demanding and paying good prices for all that she could supply and much more. This work gave her plenty of light, healthy employment, as well as plenty of pin-money. To be sure all her eggs did not turn into chickens, but a large proportion of them did, and she was careful to set only those whose fertility and freshness she could depend upon.

Another farmer's wife whose pin-money was running low, and who wished to replenish her purse by her own exertions, called upon several of her town friends, just before early fruits and vegetables were ready for use, and made arrangements to supply each family with so much a week of whatever she had to dispose of; then prepared and delivered the same at the appointed time. She did likewise with her butter and eggs, milk, and even the buttermilk, which was not needed for her poultry and the pigs, for a number of her friends wished her to bring them a jugful of it once a week. Green peas, new potatoes, early apples, and vegetables, were all eagerly inquired for and supplied in their season by the energetic little woman, who was not too proud to attend to every little detail of her business herself, and saw to it that every article she offered for sale was just as it should be.

A good fat calf, or a few early lambs will always bring good prices if well fattened and placed upon the market early in the season and in the best possible condition. It pays every time; for remember that it is the "Early bird that catches the worm" There are many ways in which pin money may be gained, but for an all the year's supply of the same there is no better or more profitable way than to keep a herd of good cows, selling the proceeds therefrom wherever and in whatever shape you can dispose of them to the best advantage; for besides the pin money which they bring in they help in a great measure to keep the farm in better condition than it otherwise would be; for lands must needs be constantly enriched to counteract the great drain upon its fertility by cropping.

Of course a great deal of the success of these plans depends very much upon being near to a good market where you can sell all that can be produced upon the farm, but much the greater part of it depends upon those who manipulate these operations; and whether pin money is scarce or plentiful depends very much upon the kind of a wife the farmer has. One case in mind which illustrates this point is that of a farmer's wife who in her early married life became the possessor of a hand loom, with which she wove flannel, rag carpets, coverlets, etc., enough to pay the greater part of the price of one hundred acres of land which they had purchased, also the cost of building a large stone house, good barns, and other out-buildings later on in life, besides rearing and educating a numerous family, two of whom were successful school teachers. Her husband was heard to remark that she had made more out of her loom during their life time than he had made off the farm; which was perfectly correct, as was well known to many in the vicinity in which they lived. When she died it was found that she had money out at interest for a number of years, for which she would never receive but five per cent., although the legal rate was six, while some were demanding seven and eight. The problem of earning pin money was no mystery to her; nor was she penurious with it or uncharitable to the poor; on the contrary she was ever to them a kind and generous friend, sparing neither her purse nor herself in supplying their most urgent needs. And surely what one energetic, persevering woman did can be done by others who will use the same industry and economy that she did.

No one who has ordinary strength and intelligence, and is not afraid or ashamed of hard work, needs to be long in want of pin money if they will only look about them and are willing to do whatever they find is needed to be done, no matter if the work is not at first just what we would prefer doing so long as it is honest and it pays us to do it. There is a place for everyone to fill. Let us each strive to find out what we can do to help our fellows and at the same time to help ourselves : and "Whatsoever our hands (or our brains) find to do, let us do it with our might." It is infinitely better and much more to our credit to earn one's own way in the world if we are able than to be an incumbrance upon the good nature and charity of our friends or relatives, or to live a life of ease at their expense. There are not very many, comparatively speaking, who cannot in some way earn their own pin money if they but choose to exert themselves. There is a measure of success for all who will win it, in this line as well as in others, if we are but willing to pay the price for it, which is but honest industry and perseverance.

WOMAN'S DUTIES AND POSSIBILITIES.

By Mrs. T. M. Carpenter, Grimsby, Ont.

In this whirling century the benefactors of the race will be those who can best instruct women on the lessening of self-enforced duties and the careful economy of time, and teach them how to think practically and to dare to act unconventionally, if by so doing they save precious moments and secure rest and peace of mind. Consider the burden of recollecting the infinitesimal items upon which depend the comfort and happiness, as well as the superfluous social status of a family. It is unremitting, and as a sex, woman is disposed to take things too seriously and dissipate vital force in that nervous debauch known as worrying, which will kill. Modern science has brought to light nothing more interesting and useful, from the standpoint of science, than this fact, and, more remarkable still, it has determined and can give in full detail, because of recent discoveries, just how worry destroys the nervous system. The theory is a simple one. Briefly put, it amounts to this : That worry injures, beyond repair, certain cells of the brain ; that the brain being the commanding centre of the body, the other organs become gradually injured, and some diseases of these organs, or a combination of them, arising, death finally ensues. It is precisely as if the brain was struck lightly with a hammer every few seconds, with a mechanical precision for days and weeks, with never a sign of let-up or the failure of a stroke. Such a succession of blows from a hammer would, of course, injure the brain irretrievably almost immediately, but it helps to illustrate the idea and make it more vivid. For just in this way does the annoying idea, the maddening thought that will not be done away with, strikes upon certain nerve cells, never ceasing, and week by week diminishing the vigor of these delicate organisms that are so minute that they can only be seen under the microscope. A brain has never been known to break down from over work ; many have from worry. A woman may fret on and on and still keep fairly well. But there is always the danger of "possession" of the "one idea", suddenly grown to be dominant, mastering the will power and paralyzing, as it were, the working of the system.

How can worry be abolished ? Simply drop the morbid idea that causes it and put in its place a true thought. Let go of it ! If it comes back again thrust it out as you would a robber entering your room. Why should we worry about what is past ? We cannot remedy it further than to benefit by the experience it has brought us.

"Only a day at a time. There may never be a to-morrow.
  Only a day at a time and that we can live. We know
The trouble we cannot bear is only the trouble we borrow.
  And the tidals that never come are the ones that fret us so.
Only a step at a time. It may be angels bend o'er us,
  To bear us above the stones that wound our feet by the way.
The step that is hardest of all is not the one just before us,
  And the path we dread most may be smoothed another day."

Upon her wisdom, industry, economy, supervision and executive direction the character, the happiness and the prosperity of the family depends. Her life must of necessity be a concession in little things, a continual sacrifice. What an enormous responsibility and how few realize it? If large classes of girls are allowed to grow to womanhood without an opportunity to acquire the knowledge and habits requisite for the successful performance of the duties they will naturally be called upon to perform, it is inevitable that humanity must suffer. A smattering of knowledge will not be enough to equip our modern woman. Science fortunately has come to her rescue. She in turn has rescued science from the exclusion of the laboratory and experimental station and put it where it belongs in the home. John Ruskin says, "There can be no healthy thought without labor and no happy labor without thought, the two are inseparable!" Ignorance in cooking and bad management waste five hundred millions of dollars of food every year in the United States. This startling information supplied by a reliable statistician has caused increased activity in the direction of providing industrial schools, and they have become a recognized necessity in the more advanced centres of civilization. Our own Board of Protestant School Commissioners, Montreal, with the foresight for which they are famed, have now introduced the study of cooking into the curriculum of several of their schools. The Aberdeen School, in St. Denis Street, has a perfectly finished kitchen and from the adjacent Commissioners school arrives a fresh contingent each day, to take a practical lesson in cooking, one hundred and fifty pupils having these lessons in the week; and now the Riverside school, in Point St. Charles, is also to enjoy the privilege, with how far-reaching results we can hardly estimate, for already from the north of our city have we heard a volume of thanks from parents whose children have had the benefit of these lessons. The course comprises the following subjects: A general knowledge of the nature, use and preparation of the various kinds of food, such as meat, vegetables, cereals, fish, soups, puddings, bread and food for invalids with practise in the best and most economical methods of cooking them. The pupils are taught to prepare and clean all utensils used and leave all in nice order when done—a most valuable lesson you will say. The teaching of cookery is not simply in imparting a knowledge of the preparation of certain dishes, but includes instruction on the nature of the food and the art of choosing suitable, nourishing, and, at the same time, economical articles of diet, in order that the smallest income may be made to serve the needs of even large families.

These seems to be a general impression that housekeeping virtues grow on trees, to be had for the picking, but capacity of any kind never grows spontaneously. There is a disposition to assume that women should in some supernatural way grasp readily this most intricate art of good housekeeping; as well imagine that without any training our boys will be expert engineers or skilful agriculturists. It is our special privilege to make the home attractive and comfortable. Louisa Alcot says: "The home-making, the comfort, the sympathy, the grace and atmosphere that a true woman can provide is the noble part, and embraces all that is needful for soul and body." The girls, the future housekeepers and homemakers, should study to fit themselves for the position, to do it with the greatest ease to themselves and the most comfort to the household. While doing for the comfort of others let us be just to ourselves. If overtired, one is irritable; no woman overworked can be either good tempered or cheerful—two requisites necessary to make the happy home, as one of the secrets of successful management at home is to keep one's own temper and to take care not to upset any one else's.

Let us acquaint ourselves with the interests of our children, studying their disposition and inclinations, entering into companionship with them. No woman should be the slave of her work; too many housewives forget that the work of the household is intended merely as the ministry to the general comfort of the home. Let us have our kitchens fitted up with every convenience to save our steps and lessen our labors, using labor-saving appliances as far as practicable, making our work as easy as it can be made. Of course, the meals, with the concomitant amount of dishes to be washed and cleaning up to be done, the once-a-week washing and ironing of the garments and linens of the household, the mending and making of the garments of the family, with the attendant darning of the family hosiery, are indispensable duties, but let us make them as light as possible and contrive to devote a portion of each day to reading and spare the evenings to the family, entering into the children's games and keeping in touch with them. It may take considerable planning to do this, but though we sometimes fail, by repeated efforts we will conquer and feel ourselves well repaid for our efforts by the influence we will thereby gain over our children and the unity and companionship in our family circle. A woman's duties are many, her possibilities even more. "Wherever her life touches another life," says Dr. Lorimer, "there she has opportunity. The finest, the most delicate, the most irresistible force lies in the mutual touch of human lives." To mix with men and women in the ordinary forms of social intercourse becomes a sacred function when one carries into it the true spirit. Captain Archer, in speaking to the lady to whom he owed his reformation, says, "I have to thank you I am what I am, for the influence of a good woman is boundless and the power of a high-minded one almost infinite." The woman who helps a man to lead a good life is greater than a queen. The woman who dares to rebuke evil, to speak fearless truth, to show by example how noble life may be made, i one who does the work of an angel on earth.

There is but one sight more beautiful than the mother of a family ministering happiness and sunshine to them all, and that is a woman who, having no family of her own, finds her life in giving cheer and comfort to all whom she reaches and makes a home atmosphere wherever she goes.

BREAD-MAKING.

By Miss Laura Rose, Guelph, Ont.

Bread-making is one of the most important processes that is applied to the preparation of human food. When we consider the vast amount of bread consumed in our homes, should we not as housewives acquaint ourselves with the very best methods of producing this food, not alone striving to please the eye and the palate but studying more especially its hygienic qualities. The art of bread-making consists in converting flour or meal into a firm and porous substance which can be readily masticated, and, while retaining a certain amount of moisture, is not noticeably moist or sticky. Salt is added to improve its flavor and appearance, imparting to it greater whiteness and firmness. Bread varies much, both in its digestibility and nutritive properties, just as in its physical appearance and chemical composition. These differences depend partly on the mode of preparation and partly on the kind of flour used. Badly made bread is often the cause of dyspepsia, the fermentative changes continuing in the stomach, generating carbonic acid gas, causing heartburn, sour stomach, and many other troubles.

Bread is commonly made from wheat. Wheat has four distinct parts,—the outer coat of bran formed almost entirely of indigestible matter, as is the next coat or thin cuticle. Then comes the rich gluten cells, and lastly the starch cells. The whole wheat flour, which we hear and read so much about, has only the hard indigestible covering of the wheat removed and is therefore much more nutritious than flour, which has been so highly refined that scarcely anything but the starch remains. In selecting flour do not choose the whitest, but that which has a yellowish tinge and a rather gritty feeling. It makes a firmer, elastic dough. If your bread is not good do not always lay the blame to the flour. My experience in bread-making is that yeast has as much or vastly more to do with securing good results as any other one thing I have made bread from the dry yeast, the compressed yeast, and from the home-made hop yeast, and the last has always proved the most satisfactory. In my opinion it certainly imparts to the bread a sweet flavor no other yeast produces.

To make hop yeast, grate four medium sized potatoes into a stone crock ; add three tablespoons of flour, two tablespoons of sugar and one tablespoon of salt. Take a generous handful of fresh, loose hops, put them in a kettle, pour over them one quart of cold water and boil for fifteen minutes. Strain the boiling hop water over the ingredients in the crock. Let cool to blood heat, then stir in one dry yeast cake which has been soaking in a little lukewarm water. Never pour hot water on yeast as the ferment in it is a vegetable growth and is killed by extreme heat, just like any other plant. Only buy a small quantity of the dry yeast at a time (5c. package) and be sure it is fresh. I always use a yeast cake in preference to old yeast. Keep the crock containing the yeast in a warm place. If it be made in the morning, by evening the yeast will be light and smell like strong beer, and is ready for use. This amount will be sufficient for several bakings. The next morning after making it should be put in a self-sealer jar and kept in a cool place.

In making bread I set a sponge to rise at night. A stone crock is best to make it in, as when it is warmed it holds the heat well. Always measure the water and make sufficient sponge to mould the bread in the morning—two quarts make eight good sized loaves. Have the water quite warm but not hot, sift in enough flour to make a stiff batter, beat thoroughly, add two cups of yeast, beat again, and put in a warm place over night. By wrapping it up well the heat can be kept in and the sponge will really seem warmer in the morning than at night. After I have set the sponge I lay a paper in the bread tins and sift them full of flour. In the morning I slip the tins into the oven taking care not to overheat the flour. This, of course, is only necessary in cold weather. Have a tin on purpose to mould the bread in and use it for nothing else; one with an oval bottom and tight fitting lid can be bought for $1.00, and will last for years. Put the warm flour into the tin, sprinkle on two good handfuls of salt, pour in the sponge, and mix into a firm dough. Knead well for at least fifteen minutes. The dough will lose its stickiness and become elastic owing to the changing of the gluten. Thorough kneading gives a nice, fine, white, close-grained bread. Cover it up well in a warm place. When it has increased twice its original bulk, or when by pressing down the dough a bubble rises, it is ready for the pans. Cut into pieces the size required for the loaves and just handle enough to mould into the proper shape. Put into well-greased pans and let rise until they have increased fully twice their bulk. The oven should be moderately hot. If too hot a thick crust forms which prevents the heat penetrating to the centre of the loaf, the result being a burnt outside and an under-done centre. Bread should remain in the oven from one to one and a-half hours, according to the heat of the oven and the size of the loaves. When taken from the oven it should be immediately lifted from the pan and set up against the pan so that the air can circulate freely around it. When cold put it in the bread box—a tin one is best—which should be frequently scalded and well aired once or twice a week by putting it outside in the sunshine. Never put cloths of any description about bread. The cloth absorbs the moisture and soon has a sour, disagreeable smell which it imparts to the bread.

It will be noticed that I do not use shortening, potatoes or sugar in making my bread. If the flour makes a very dry bread some finely mashed potatoes or a little lard may be used, but I prefer not to use either.

"The pie may be delicious,
 The cake as light can be;
But yet, methinks, the home-made bread
 Is best of all the three."

SANITATION IN RURAL DISTRICTS.

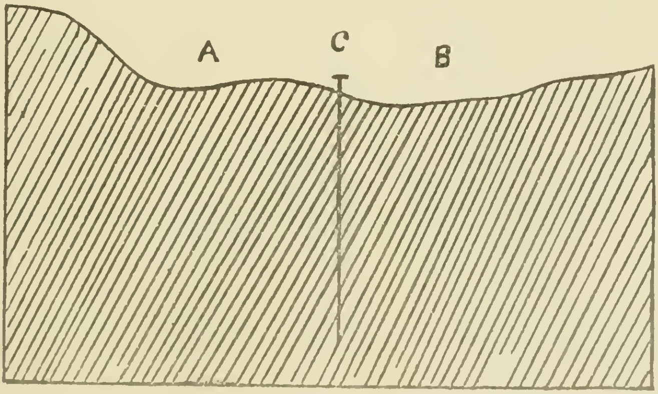
The almost complete disregard of sanitary laws in country districts, and in many towns and villages, has been the subject of numerous reports of boards of health, but is, nevertheless, very little considered by those most affected by such neglect. The necessity of following out rules of health on the farm and elsewhere is, however, so important that it is bound to come more to the front every year, and, while it will not be possible to obtain such complete sanitary conditions in the country as are available in cities with their sewerage systems, yet we can get practically as good results from simpler methods, and, withal, utilize our waste matter and sewage in the fertilizing of our farms and gardens.

Among the scanty literature, apart from board of health reports, which have been devoted to the subject of country sanitation, our attention has been drawn to a booklet of 84 pages compiled by Dr. Harvey B. Bashore, inspector of the State Board of Health of Pennsylvania, and entitled "Outlines of Rural Hygiene," in which the author in plain and concise language deals with the questions at issue, and points out the most effective and feasible ways by which the difficulties involved in carrying out health laws in country houses can be overcome.

WATER SUPPLY. Chapter one treats of the water supply, for which nearly all those living in the country are dependent on wells. The importance of having a supply of pure drinking water for country houses cannot be under-estimated, and yet it is a lamentable fact that a large number of farm wells are very little better, if any, than cesspools, and there is this added danger that their clearness, which is usually taken as a sign of purity, may yet hide the worst kind of infection. Many an epidemic can be traced to wells polluted by surface or subsoil drainage from privies and other sources. Discharges from a typhoid fever patient have in several instances affected a well and transferred the disease to others who drank of the water from it.

Dr. Bashore very properly lays great stress on the location of the well. This cannot be determined by any distance because it depends entirely on the character of the strata of the soil and the direction in which the ground water runs. It is quite possible for a well to be near a privy or barnyard and not be contaminated, if it is in a bed of compact, impermeable clay, or if the lines of the strata of the soil run away from it. And here the author notes a point, that modern investigation shows that the old idea that deep wells passed through a impervious stratum and drew water from a deeper layer beneath, has a very limited value. This can only happen in what is known as a geological basin, which are few and far between. Such formations are found at London and at Paris. Where the strata are quite or nearly perpendicular it matters not how deep the well is, it can never be deep in a sanitary sense, because in such strata there cannot be an impervious layer. Hence in such a geological formation wells should never be sunk without ascertaining whether they are likely to be contaminated by sewage or other sources of pollution.

The following sketch taken from the work in question shows a region in which the rock layers are almost perpendicular. In places like this, if you are going to dig a well, it makes a great difference whether a privy is located at A or B. If there is one at B or in any place within 90° on either side, then the well will be almost certainly contaminated, for the leaking water will only have to follow the cleavage lines in order to reach the well. The only possible location for a privy in the neighborhood of the well lies in the direction of A where the cleavage runs away from the well.



Cross section of a region of upturned strata.

In a limestone region pollution of wells is very possible, even at great distances, on account of the many underground seams, which are often connected with sink holes on the surface. The author gives an instance of a typhoid fever epidemic at Bethlehem, Pa., which was caused by pollution of an otherwise pure water supply by underground water courses in the limestone, which had carried the infection from far-off privies.

Clay, owing to its imperviousness to water, is the best soil in which to dig a well, because what water does pass through is generally filtered. Gravel, on the other hand, presents directly opposite qualities.

THE IMPROVEMENT OF WELLS LIABLE TO POLLUTION. It is possible to render polluted wells more or less safe, and for this purpose the author recommends the following method, which was devised by Dr. Koch:

Take out the pump, if there is one, and pour in sand until it reaches within a foot or two of the *lowest* water-level; as the lowest level is generally attained at the close of a dry, hot summer, the work should be done then. Now place in the centre of the well an iron tube three or four inches in diameter, with its lower end expanded and perforated. This end of the tube rests on the sand, and while it is held in place a bushel or two of fine gravel is thrown in immediately surrounding it, and the well is then completely filled with sand. If a pump is now attached to the tube we have a very good tube well, which differs from an ordinary one in that it is surrounded by a filtering layer of sand. This is the best that can be done with a dug well. If a tube well is polluted we can only seek a new source of supply. In dislocated strata, limestone, sandstone or loose rock, a dug well filled with sand, after Dr. Koch's method, is far better than a bored well.

In some places a shallow well. constructed in a similar manner to the one made after the directions of Prof. Poore of University College, London, Eng., might prove very serviceable. It was thus described in the *Lancet*: "The well was sunk in the very centre of a garden heavily manured with human excreta; it was placed at the intersection of two paths, a broad green one, bordering one of asphalt. The location was chosen for two reasons: 1st, that it was, as far as possible, removed from any accidental pollution from the sewer in the street, and 2nd, that in the centre of the garden it would run the greatest chance of fœcal contamination from the manure used. As the well was sunk wholly for experiment, this was essential. The garden is on the bank of the Thames and very slightly raised above the level of the water. The well is only five feet deep and the water level in the well is about three feet six inches. The well is lined throughout, from the very bottom to some five inches above the ground with large concrete sewer pipes two feet eight inches in diameter, which were carefully cemented at their junction; outside the pipes a circle of cement concrete about four inches thick has been run in. No water can thus enter this wall except through the bottom and all contamination by lateral soakage through the sides is rendered impossible. The well is surrounded by an asphalt path three feet wide which slopes slightly away from it. A close-fitting cover, cased with lead outside, prevents all contamination from above.

The water is drawn through a two-inch lead pipe, which passes through the outer concrete and the concrete lining pipe, the cut passage for the pipe being carefully closed with cement. The pump is provided with a sink and waste pipe which takes the overflow some twenty or thirty yards to a stream. The nearest point to the well upon which any manure deposits were made was seven feet. Three chemical analyses show that the water in the well is organically pure, and three bacteriological tests gave similar indications.

It must be borne in mind that this well was constructed in alluvial clay, which is very impervious to drainage A shallow well dug in such soil, and similarly constructed to the above, would probably contain as pure water as could be obtained anywhere.

CISTERNS AS THE SOURCE OF THE WATER SUPPLY. Dr. Bashore thinks that, in many places where pure water cannot be obtained by means of wells, cisterns fed from the roofs of the houses are the best source of supply. These must be built of brick and thoroughly cemented so as to keep out the soil water. A filter is also required.

This can be made by building a partition from the bottom of the cistern reaching nearly to the top, leaving several openings at the bottom to connect the two sides. In constructing the filter, which is placed on either side of the partition, three or four feet of common sand is probably the best and cheapest material obtainable, or three layers from above downward, of sand, polarite and gravel can be used. Into the side of the cistern containing the filter the pipe from the roof discharges, and into the other side is fixed the pump. The sink under the pump-spout may be perforated and empty directly into the side of the cistern containing the filter, so that there is no waste of water.

Cistern-water, even without a filter, is better and safer than well-water. To ensure cleanliness, the roofs of the houses must be kept clean, and a "cut off" should be placed in the spouting so that the first washings from the roofs may be turned into the street gutter; in this way the droppings of birds, dust, etc., are washed away before the water is allowed to run into the cistern.

Another advantage in the use of rain water is that by placing a tank in an upper room of the house one can have water *under pressure* all over the house, is so desired.

WASTE DISPOSAL. Second in order comes the disposal of waste, which in the country depends on individual effort. The most important in this category are the human excreta. Dr. Bashore favors the total abolition of privies and the substitution of dry earth closets. A very simple form of one is recommended:

"The body is a plain pine box; its sides are fourteen inches high; its depth eighteen inches; and length about thirty inches. It is divided into two compartments, one 18 x 18 inches and the other 18 x 12 inches. The larger of these compartments has no bottom; the smaller is a tight one; on top are two covers. The lower one, hinged to the upper edge of the back, extends all the way across both compartments. In the lower cover is cut the seat over the centre of the larger compartment. The upper cover is hinged to the lower one, and may be raised independently; it is made the size of the larger compartment, and both have a little edge projecting to facilitate lifting them. The receiving vessel is a galvanized iron bucket (an old coal bucket will answer) as large as will stand in the compartment with the covers down. The small compartment is filled with dry sifted anthracite coal ashes or dry earth, with a scoop for use. A small quantity of the ashes or earth is scattered over the contents of the bucket after use. A closet like this can be used anywhere in the house."

The contents of the bucket can be disposed of by placing them in a corner of the garden and covering them with earth, or by burying them a few inches under the soil. In summer the excreta thus buried will be disposed of in about two weeks and in winter in about four weeks.

DISPOSAL OF SLOP WATERS. In houses which have no sewers for the carrying off of their excreta and slops, the best way to dispose of the latter is to have a slop bowl in some convenient location connected with either a surface or subsoil drain into a garden or field. A simple form of such a drain is as follows: A box about a foot square, lined with tin or galvanized iron, is placed in a suitable location, say near the garden, to serve as the receptacle for the slops brought thither in buckets. From this extends an old tin roof-gutter to a furrow in the garden. The bottom of the box is perforated with twenty or thirty small holes which let the water into the gutter, a number of small holes being better than a few large ones, as the small ones keep back solid particles out of the gutter and prevent clogging. The gutter has a fall of six inches in twenty feet, and is pierced every three or four inches by one-quarter to one-half inch holes, which permit the liquid to flow on the soil. A sharp fall is necessary in order that the gutter may be rapidly emptied in winter time before the contents freeze. The soil must be raked occasionally underneath to hasten absorption and evaporation. This kind of drain will also do in houses with a water service, by allowing the water-pipe from the kitchen and bath to discharge into the gutter.

The drain can also be constructed of perforated bricks or round cobble stones, the space underneath being filled with small stones, cinders, and the like, to favor absorption. If ordinary bricks are used, a space of half an inch should be left between each brick. Care will have to be taken to keep the drains clear of snow in the winter time, and the liquid must be emptied before it gets chilled.

It is most important that, when a drain of this kind is used, the solid and liquid refuse be kept separate. This can be accomplished by having two buckets near the kitchen, one for the solids and one for the liquids. Over the one is placed a tin basin with a perforated bottom; the semi liquid waste from the kitchen is placed in the basin, the waste drains through, and the solids are emptied into the other bucket.

SUB-SOIL DRAINS. If surface drains are objected to, or the winters are too severe to admit of their use, then sub-soil drains can be used. A trench is dug about two feet deep, and two-inch drain tiles are used; it is best to lay them on a narrow board to get a regular pitch. Half an inch is left between each tile and the joints are covered with broken stones or pipes; then the whole trench is filled with stones, coarse coal ashes completely surrounding the tiles, and finally covered with earth. The delivery pipe from the house is run into the end tile for a short distance. At the far end of every line of tiles a a pipe should be inserted and project above the ground, so as to allow the free circulation of air through the drain. Very little odor will be caused in the house from such a drain, but if necessary a trap can be placed in the delivery pipe. If more than one line of tile is necessary they can be connected with the delivery pipe, but at least two or three feet should be left between each line of pipes.

In houses having a water service and sewers, a small shallow tank, at some distance from the house, should take the place of a cesspool. To this the sewers are connected. being flushed at intervals. A gutter made of cement, or half pipes, is laid from the tank along the field to be used, and every dozen feet or so there is a little branch drain to guide the sewage over the land. In front of each of these branches is a barrier of broken stones to check washing, and beyond this the land to be used, which is best planted with corn, as this crop admits more sunlight than grain, and sunlight is an important factor in sewage farming.

GARBAGE. Most of the solid kitchen refuse, included under the head of garbage, can be best got rid of by burning in the kitchen range. The author includes in this, bones, oyster shells and egg shells, but surely where there are poultry kept it would be better to purchase a hand bone crusher and utilize these for feeding the hens. Another way of disposing of garbage that will rot is by burying it, but combustible waste, such as rags, paper, sweepings, etc., should always be burned. Ashes, broken crockery and tin cans must be kept separate and used for filling up holes. Where an ash closet is used, nearly all the ashes will be disposed of in it.

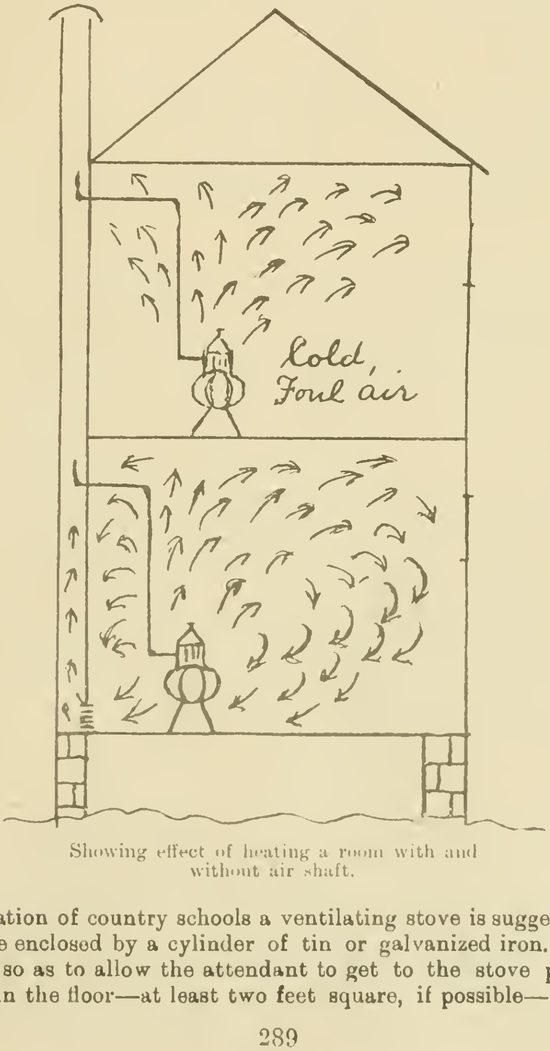
THE SOIL. A short chapter is devoted to the soil in its relation to sanitation, showing the important part played by the surface soil, filled with all varieties of lowly life, (" living earth " as it has been called), in destroying waste material, resolving such matter into its primary elements, rendering it harmless, and fit to be taken up by growing plant life—the process known as nitrification. The relationship between ground moisture and disease is also touched on, and a short section deals with the ground air, which occupies the upper layers of the soil and fills all the interstices as far down, at least, as the surface of the ground water, the composition of this air and it movements being of special interest to sanitarians.

DWELLING HOUSES. The very slight attention devoted to the foundations of country houses, and their frequent location with a total disregard of drainage facilities, calls forth a strong remonstance from Dr. Bashore. He quotes from the eminent sanitary authority, Colonel Waring, the best way of drawing the cellar area. A very thorough system of under-draining to the whole area about a country house and for some distance away, by laying different lines of drains, not necessarily under the house at all, but so as to surround it on all sides from which water flows toward it. and, in all cases, at a depth of several feet below the level of the cellar bottom, is the most efficient and satisfactory. A tile an inch and a quarter in diameter will carry more water than can usually be collected for a constant flow from the subsoil of half an acre of ground The depth of the drain should not be less than three feet below the level of the foot of the foundation.

The exclusion of ground air is also important. For this purpose, for the cellar floor and for the external packing of the foundation walls, nothing is better than smooth, compact clay. The floor may further be covered with concrete, if desired. Brick covered with melted pitch, and a layer of concrete or cement over it, makes an excellent floor.

VENTILATION OF HOUSES. Some excellent suggestions are made as to the ventilation and heating of country houses, the majority of which are heated by stoves. In rooms thus heated the floor is always from six to eight degrees colder than is the temperature four or five feet above the floor. This means that our feet are many degrees colder than the head and shoulders. To obviate this an open grate, or an air shaft opening into the room at the floor level, should be placed in the room.

The accompanying diagram shows the effect of heating a room with a stove with and without a foul air shaft. In the first case the heated air forms a partial vacuum and a draft is continually going up the chimney, sucking up the foul air and diffusing the warm air through the room, making the temperature more equal. Where there is no foul air shaft, the heated air rises and fills the upper part of the room while the floor remains cold; if the heating is brought to such a point that the lower part does become warm, the upper part gets too hot, and, if a window is opened, the heated air rushes out without warming the room and leaves a lot of foul air to be breathed.



Showing effect of heating a room with and without air shaft.

For the ventilation of country schools a ventilating stove is suggested. This consists of an ordinary stove enclosed by a cylinder of tin or galvanized iron. The front part is movable on hinges, so as to allow the attendant to get to the stove proper. Under the stove a hole is cut in the floor—at least two feet square, if possible—and this should be continued to the outside air by a shaft made of wood or tin. For the removal of foul air an opening should be made into the chimney at the lowest part of the room, and not further removed than is actually necessary from the centre of heat, as suggested in the ventilation of private houses.

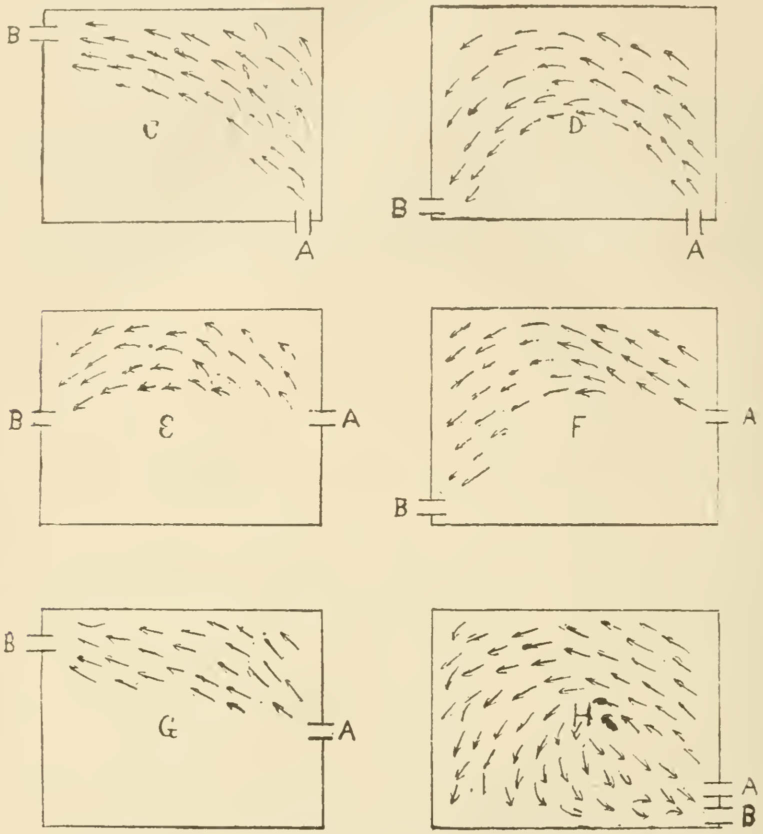


Diagram showing correct and faulty methods of heating and ventilation.
(From reports of United States Bureau of Education.
A. Inlet for heated air. C. D. E. F. G. Faulty.
B. Outlet for foul air. H. Correct.

The book concludes with a chapter on "Disposal of the Dead," and an appendix by Prof. Herbert E. Smith on "The Normal Distribution of Chlorine" in springs, streams, and lakes, the information given having an important bearing on the analysis of such waters to test their purity or otherwise.

VENTILATION OF THE HOME.

By Evelyn S. Pettit, M.D., New Brighton, Pa.

Our houses in the country! What possibilities they possess for comfort, beauty, health and pleasure, for the making of homes. They are not simply shelters from the weather and places to eat and sleep. They are not simply places to stay, even though the resident of the country finds herself obliged to stay very constantly right there, if anything is to be developed in that house which is to be made a home.

Not all the houses are large, not all have money in abundance, not all have a picturesque location or even pretty surroundings, but the home is independent of all these. Need I tell you that cheeriness, willingness to oblige, thoughtfulness for others, neatness in the home, order, promptness, good cooking and plenty of fresh air, all go to make a home? Strange as it may seem that last is the one least frequently found in our country homes where air is so cheap and ought to be used so freely.

Go into homes where dirt and disorder are never allowed an entrance, much less a lodging place, and you will often find the house entirely lacking in provision for a fresh air supply. The sleeping rooms, usually too small, may be very clean and in perfect order, yet those who occupy them come out in the morning looking pale and feeling weak and cross until they have been out in the air awhile, when that wears off. The cause is not far to seek. Go from the outer air into these sleeping rooms in the morning, before they are thrown open, and the question answers itself. The air is heavy and unpleasant, and this not because the occupants of the room had not observed proper personal cleanliness or used sufficient fresh linen, but for the reason that the system is undergoing a constant process of purifying by means of the respiration and through the pores of the skin, and the air contained in the room has become impregnated with this effete matter, until it is offensive to the smell and poisonous to the system. The atmosphere of a bedroom ought to be sweet in the morning as well as in the evening. To accomplish this in the ordinary house is not too difficult a matter, though it certainly requires some care and calculation.

I shall not consider those houses where the heating is done by a furnace which gets its fresh air supply from out of doors, nor those which have facilites for open fires in the sleeping apartments, for such houses are ventilated by force of circumstances. So many dwellings are constructed to look well and to keep out the cold ; so many are built just "to live in," where no provision whatever has been made for ventilation, and I shall talk of ways and means to purify these.

In such structures one must look to the windows for help. In the summer open the windows, open them wide, keep them open. Do not be in a hurry to set the rooms in order in the morning. The beds want to be thrown open for some hours before being made up, and it is better yet to put them out in the sun for awhile every few days.

When cooler weather comes still have the windows open ; unless your house is very loosely constructed, a positive opening somewhere all the time is a necessity.

When cold weather comes if you do not wish direct cold, lift the lower sash a little and place under it a board completely closing that aperture. There will be an air passage between the upper and lower sashes which allows a continuous exchange of air without any direct draught. Do not be afraid of fresh air. There is much greater danger of colds and pneumonias from breathing vitiated air and being in rooms too warm than from the cold air one gets in a properly ventilated room.

But pure air alone will not keep sleeping rooms sweet in cold weather. Heat is necessary. If there is a big hall stove all the rooms upstairs can be opened into the hall up there and, with the provision for ventilation in the rooms, the heat will come up sufficiently for ventilating purposes.

Put a drum on the stovepipe where it passes through the upper room. If there is no hall down stairs put on an extra fire in the room at the foot of the stairs and open the stairway door and the result is the same. I am taking it for granted that the air in the room below is kept pure.

Are you afraid of "night air"? It is the only kind you can get at night and you would better be careful to have it pure. To secure that purity it is necessary to look to the surroundings of the house. It is not necessary that a farmer's home should be surrounded by weeds, even around the back kitchen door. It is not necessary that water, or crumbs, or dust from the sweeping, or parings from vegetables, should be thrown on the ground anywhere near the house. Neither is it necessary to have the receptacles for the feed for calves and pigs used and re-used without proper cleansing until they become an offence to the nostrils and a weariness to the eyes. If these conditions do exist, then you do well to try to shut out the "night air."

The next consideration is how to avoid these things. If you cannot have a trough, or pipe, or drain of some kind, to carry the water to a distance from the house, then provide yourself with a pail which can be carried away and emptied when filled. Burn the dust and papers and scraps. If you throw out crumbs, they lead the chickens around the the kitchen door and they are anything but a help to the sanitary surrounding of a home. Put the crumbs with other scraps from the table and take them to the hen-house, or wherever it is that the fowls run.

The parings from vegetables are usually fed to the hogs. They can be carefully kept for that purpose. But whatever you do keep the house surroundings clean and as dry as practicable, that the air may be pure and sweet; then do not be afraid to use that air night or day.

SELECTION OF A HOME.

By A. J. Reynolds, Danforth, Ont.

There is a certain dignity, independence and pleasure to which every Canadian citizen is entitled derived from the ownership of his own home. To spend an existence subject to the dictation of another. to a certain extent, humiliates his manhood. It hampers his enjoyment and curtails his hopes and anticipations. He has not the motive for devoting his leisure hours, his best thoughts and efforts to beautifying his home, making it more comfortable and adding to its value by cultivating fruit and shade trees, improving buildings and fences, and doing the thousand and one little things about farm and home which suggest themselves, because he knows he must eventually part with them all. Attachment to a man's home means attachment to his country.

The idea of proprietorship and permanency should enter into the composition of every true and perfect home. It is better, as a rule, to own the land on which you live, even though you cannot entirely pay for it when purchased. The farm is the home of yourself and family, and all should feel that it is as permanent as such things can be. Much of your very life goes into the soil, the trees and the buildings upon it—not only the sweat of your brow and strength of your muscle, but your thoughts, your hopes and your anxieties. Around every tree, shrub and vine may be entwined the joys and associations of home. Your children are born and raised, are happy, sick or may die there. If the land is only leased the time will come when you must leave it with all its pleasant and sacred recollections. An energetic farmer may lease and succeed quite well while he keeps his health and strength, but should these fail him his family may be adrift upon an uncharitable world. The man who is sole proprietor of his farm, small though it be, and poorly provided with machinery and improvements, is much happier than he who expends his force on another man's land. The consciousness that he must leave at the owner's bidding the improvements, associations, conveniences, and all that he has brought around him, perhaps just at an age or condition of health when he is least able to encounter the fatigue and embarrassments attending the making of a new home, is ever present in his mind. Remember that much of the reward of years of labor comes in the form of better buildings, fences and other improvements, which are seldom realized upon a leased farm. It is our duty to secure the greatest possible amount of health, comfort and culture for ourselves and family. This requires at least four distinct considerations: a healthy locality, good land and good improvements, good facilities for education and religious services, good markets and good roads. Few men secure all these, but many of us must be content with securing only a portion of these blessings. A fertile farm in an unhealthy neighborhood is much less desirable than one of ordinary soil in a locality where you can enjoy the blessings of health. Always avoid a district known to be unhealthy no matter how cheap the land may be.

Determine in advance what kind of farming you purpose following and seek a soil and other conditions necessary to make it successful. If you are going to make a specialty of any single crop, you should be well posted as to the nature of the soil, climate and other conditions necessary to success. But if you intend to engage in mixed farming there are but few townships in this country where a suitable soil cannot be found. In examining a piece of land you think of purchasing, if a stranger in the locality, learn all you can from neighboring farmers. Ascertain the cost of labor, the quality and size of the crops raised, then methods of cultivation, and many other things which would suggest themselves to the man seeking a permanent home for himself and family. Ascertain what are the present and prospective facilities for common and high school education for your children, and for the social enjoyments and religious advantages. Look out for a plentiful supply of pure water. An inexhaustible spring or small stream upon your farm is almost indispensible, and adds largely to its value. Facilities for marketing your produce must be taken into consideration, how far it is to the nearest town or city, the distance to the nearest railway station, and the kind of roads to be driven over are also points well worth considering. Do not purchase poor land at any price while there is so much good soil to be had. A small farm well tilled will bring better returns than a large farm but poorly managed. System and thoroughness in all things apply most emphatically to farmers; and if the farm is too large for the farmer and his means, many things have to be neglected whereby he loses money. And remember you are buying not only in your own interest, but also in that of your children. Buy so as never to regret it, for regret is followed by discontent, dissatisfaction and failure.

FARM LIFE AS A SCHOOL OF TRUE MANHOOD.

By W. A. McCallum, B.S.A., Ailsa Craig, Ont.

Farm life as a school of true manhood, shall be the name of this paper, and in this connection we will contemplate the producer and consider the bearing of the husbandman's art upon the man. There are those who consider farming a menial occupation,—degrading to the body by the toil it imposes, and belittling to the mind by the attention it requires to the minute details of its business. They regard its implements as the badges of servility, and look with disdain on the plow-boy's lot. They depreciate the influence of farm life upon social and mental culture, and look upon the rustic man as a type of boorishness and ignorance. They think it mainly a business for brute muscles, where mind can achieve no conquests and where skilful labor finds no reward. They think the way of a man of genius is inevitably hedged up upon the farm and that there is no heroic work to be performed, no laurels to be won. If he would do deeds worthy of his manhood—gain wealth, gain honor, make himself a name that will live—he must turn to nobler occupations. If those who are strangers to the farm alone cherished this view we would abide in silence, but when farmers themselves admit this impeachment of their calling, and the pestilence of this heresay finds its way to our firesides and makes the sons and daughters discontented with our rural home, it is time to speak out. If comparisons must be made which are invidious, the shadows shall not all fall upon the farmer's lot. It is time that other callings should be stripped of that romance in which they are veiled, and that the sons of the farm should know what they have in prospect when they turn their backs upon the homes of their youth. It is meet that they should better understand their lot, its capacities for improvement, and its superiority to all other occupations. We would arrest that feeling of disquiet which keeps so large a part of our rural population perpetually longing for new fields of enterprise. We would have them settled, at least a portion of them, in the old country, and bend all their energies to the improvement and adornment of their homes.

Beginning, then, where nature does, with the body, there is no place like the farm to bring forth in their full strength man's physical powers. This is an essential part of our manhood, though it may somewhat shock the sentimentality of this age. The idea, we believe, has become somewhat popular that health and vigor are not the normal state of the race. The true type is a lean, pale biped, whose natural organs all need assistance to perform their accustomed functions. The eye becomes dim at maturity and must have the aid of glasses. The hand must be gloved before it is fitted for society, and the legs must have the support of a cane before they can perform their office. A face, brown with the sun and flushed with health, is not intellectual, and a hand hard with toil and moist with the gloss of healthful blood beneath the skin is decidedly vulgar. We reverse the process which brings out our ruddy fruits, hardy vegetables, and high colored flowers, and resort to all manner of ingenious devices to dwarf, bleach, and deteriorate the race. Broad shoulders and brawny muscles are at a discount.

This picture is not realized upon the farm, and cannot be where the tillers of the soil are true to their calling. They do not accept this sentimentality as the true type of manhood. The Creator has dwarfed nothing, and has given man a body to be developed and to reach the perfection of its kind after its own laws. Soul and body dwell in happy union only when each follows its own laws of growth. The men who have left their mark upon the ages in which they lived, who have done a great and noble work for the race, have been, with few exceptions, men of noble physical mould. The whole tendency of farm life is to develop the body healthfully and symmetrically. The child is not pent up in the narrow back yard of a city dwelling or turned into the thronged and filthy streets to pursue his sports. His eyes open first upon green fields and fragrant meadows, beneath the shady trees of his rural home, and then as he grows strong his powers are not let run to waste for want of useful employment. The farm has many a duty that the boy can discharge, and he begins to be useful ere he ceases to be a child. It is a proud day when his young hands seize the reins to guide alone the horse, and prouder still when he is trusted with the wagon, loaded with grain, for the distant mill. That natural aversion to toil which is born with us all—as universal as our depravity—is overcome so early that in many cases it is not remembered at all. He only assumes responsibility as he is fitted for it. He grows up strong and manly in stature, physically prepared to meet the burden and heat of the day.

We pass on to notice the influence of farm life upon the mind. It is probable that this class does not have as good facilities for education as the population of cities and villages. The husbandman's calling itself is a means of education possessed by no other class. In no other calling is there such a demand for varied knowledge; and where this demand is met the intellectual faculties are sharpened by use. It quickens the inventive faculty as no other calling does. The farmer's boy begins the education of this faculty as soon as his young hand can grasp the knife and wield the hammer. Whatever his boyish fancy covets to play with he must realize by his own endeavors. The farmer is generally remote from a mechanic, and oftentimes when he requires work done it is far more convenient to do the job himself than to visit the distant village. Of course he cannot turn off that finished work which long practice alone can secure, but he does the work sufficiently well for his purpose and saves time and money. Thus the mother wit, which has been sharpened by the discipline of farm life, comes to a ready market in all other callings. Next we will notice the moral quality which farm life tends to foster. Independence finds here a sturdier growth than in any other pursuit. A farmer's labors, if he is a wise cultivator, look to a permanent occupation of the soil. It is perhaps the old homestead where his eyes first saw the light; the scenes of his childish sport, endeared to him by all the precious memories of father and mother. The homestead! What son of the farm, whether still upon the soil or struggling for wealth in the fierce competition of the city, or battling with the waves for his bread, has not the dear old spot enshrined in his heart; a place of nightly pilgrimages in dreams. I count it among the misfortunes of birth to have entered upon life under a stranger's roof, to have spent each year of childhood in a new house, to have grown up with no strong local attachments, with the memory a blank or a confused scene of comfortless encampments in a pilgrimage, instead of a bright sunny spot with its surroundings of embellishment wrought by parental love. Blessed is the man who has such a country home, however humble, around which all the associations of his youth and childhood cluster, where every tree and shrub is a keepsake of loved ones now widely scattered over the earth or gone hence to the better land. Richer far than any other pecuniary inheritance could make him is the man who has such a rural home treasured in his memory. It is not only one of the best schools of physical and moral training in youth, but one of the strongest bonds of virtue in after life. His means of living are more his own than are those of others. In the age of homespun the farm not only fed but also clothed its tenants. They drew out almost everything they needed from the bosom of the soil, and now that the arts have made an exchange of products more economical for the farmer, he by no means barters away his independence. He can, if necessity require, go back again to the wearing of homespun and make the farm his kingdom and other men his vassals.

Another of the manly qualities, lying close beside independence, too often overlooked and too much despised, is patience. This is a legitimate growth of farm life and is one of the virtues that command success in all occupations. Men who leave their mark upon society, who achieve great and noble works for the race and fame for themselves, are more indebted to this quality than to any natural endowment. The very work of the tiller of the soil is a discipline of patience. "Behold the husbandman waiteth for the precious fruit of the earth, and hath long patience for it, until he receive the early and the later rain."

Closely allied to this is a virtue which may be termed "push." The patience of the farmer is not a passive quality, but it is resolute and watching for a fitting opportunity to undertake the work to be done when all things are ready. Waiting alone will not answer his purpose or bring up the old homestead to the ideal of a good farm. He has already pushed through some enterprises that have been successful and taught him what he can hope to do. He has already pushed out the bottom of a foul pond in the rear of his barn where the frogs have greeted the spring from his boyhood up and where toads have cooled their sides during the summer heat. An improvement upon his farm resulting in larger crops, is a constant source of satisfaction. A stagnant swamp changed to a luxuriant meadow by his own hand is a thing of beauty and a joy forever. He sees the rough broken acres of his tillage rounding into form. His labor has its reward in the increased productiveness of his soil, in the increase of his stock, and in the enlargement of his own comforts. And this leads us to speak of the influence of farm life upon the home virtues. No occupation can be more favorable to the cultivation of those qualities which are the charm of the domestic circle. The farmer is much more at home than is possible with many other men. How many are there in our cities who only see their families at evening or on the Sabbath? They live for their business, and this, on account of its location, takes them from home early and late. How many from this same cause forsake housekeeping and huddle into boarding houses and hotels where the charm and beauty of the family, as God instituted it, are entirely lost.

I will now point out the moral of this paper. If the farm is the efficient school of these manly qualities—and we have seen that it is—all classes of society have a direct interest in the improvement of the soil and of its cultivators. If I have spoken justly of this calling, and not overestimated its influence upon the character, is it wise for tillers of the soil to send forth so many of their sons and daughers to other pursuits and retain upon the soil not enough of their skill and wealth to develop its resources? Let us then cleave to the paternal acres and make them more fruitful and beautiful. Let every passing year witnesss our onward march at home.

OUR SOCIAL AND NATIONAL LIFE.

By W. G. Smyth Rowena, Ont.

My attention was called to this subject some time ago by a newspaper paragraph, in which the increase of population in the cities and country was given. The population of the cities of Ontario has increased 101,000 in the last ten years, while the population of the townships has decreased 36,000 in the same time. The over-crowding of cities, and of professional life, is one of the problems of the day. It is one thing to obtain a certificate to teach school; it is another thing to get a school to teach. It is one thing to graduate as a doctor or lawyer; it is another thing to get elbow room in this Province to practice either medicine or law. It will, we think, be admitted that farming is not overcrowded. Farm products are in good demand, and the prices are on the whole, remunerative. In view of these facts it seems to me that there is too much inclination on the part of boys to leave the farm for city or professional life. I do not want to be misunderstood on this point. I am well aware that labor-saving machinery has greatly lessened the amount of labor required in farming, and I am equally well aware that it is not desirable for a farmer with several sons to divide and subdivide the farm until the yeomanry of this country become peasants—owning a few acres and a cow. But I have noticed several cases where the last boy has been inclined to leave the farm. This tendency is very greatly to be deplored, both from a moral and material point of view. Mr. James Massey, late warden of the Central Prison, recently gave an address on "Points of deformity in the citizenship of to-day," in which he uses these words: "The home of to-day is responsible for the development of criminal tendencies, from the lack of training in individuality and self-respect that comes with it. The increase in number of defective, delinquent and deformed in our cities is one of the social problems of the day. The tendency to seek city life by those born in the country is a factor in it. Upon entering city life the morally and intellectually weak individual naturally gravitates into association with the criminal class. The morally weak, even when they have attained to manhood, yield too readily to temptation. How much more susceptible are the young, who are weak and untrained in directive home instruction?"

The question now arises, why this tendency city-ward and how can it be prevented? There are, no doubt, industrial and financial reasons for the desire for city life, but we believe the amusements and excitements of the city are the main attractions. Sometimes the high schools are blamed for giving young people a notion for city life, and in support of this it is pointed out that after going to the high school young men seldom come back to the farm. The fact is, such young men went to the school for the express purpose of getting an education to qualify them for the professions. We do not believe there is anything in the teaching of our high schools that tends to disgust or unfit a young man for farming, but, on the contrary, we believe that every young man who contemplates being a farmer should have at least a short training in the high school. In this connection we are in sympathy with high school extension, so that farmers' sons might have an opportunity of taking an agricultural course during the winter months without the formality of passing an entrance examination. The days of ignorance on the farm are passed. The farmer now needs to be wide awake, intelligent and educated, if he is to keep abreast with the times.

But the boy who has taken a course at the high school and has had his intellectual faculties stirred, needs ample opportunity for the cultivation of social and intellectual life on returning to the farm. To this end we strongly favor country places having public libraries, literary societies, and church entertainments. With the encouragement given by the Government, it is an easy matter to have a public library and thus lessen the individual expense of buying books. A literary society is a wonderful incentive to study. Let a young man be given a place in a public debate and we find him seeking information in every direction, and knowledge gained in this way and used in the debate is lasting. Besides the knowledge gained in preparation, the art of public speaking is something that every young man should cultivate. Some of the best speakers sent to the farmers' institute meetings by the Government attribute their success to the early training received in literary societies. Church entertainments also afford a good opportunity for the cultivation of social and religious life, and young people should be encouraged to take a deep interest in the work of the church. In these social gatherings in connection with the church the various sects meet together and spend a profitable social hour, and in this way a spirit of union is encouraged between the various churches. Not only do the sects meet together, but the sexes also have a chance for friendly meeting, and very often these friendly meetings result in union, too—a union that Dickens has aptly described as "a union of hearts and housekeepings." Added to these outside helps the home should be liberally supplied with reading matter and music. A young man who can find entertainment, recreation and companionship in books and papers will not be apt to get into bad company or bad habits. But in some country homes there are no books or papers to be found, and how often have we seen the boys from such homes spending their evenings at the dance, or raffle, or the bar-room, or loafing at the country store. The money spent by the boys in these places would have much more than supplied the house with good reading matter. Boys should have high ideals set before them. It is said that every boy in the States starts out in life with the idea that some day he may be president. It would not be a bad idea for every farmer's son to start out with the thought that some day he might be Minister of Agriculture. "There is no royal road to learning." A great man once said: "The secret of success is work."

"The heights by great men reached and kept,
  Were not attained by sudden flight;
But they while their companions slept,
  Were toiling upward in the night."

Someone has said there is a standing advertisement, "Wanted, a man."

Every farmer should be a member of the Farmers' Institute, and should take an agricultural paper. It should be one of the highest ambitions for a farmer to take an active, intelligent part in the annual programmes of the institute meetings. Mr. Hodson, Superintendent of Farmers' Institutes, says: "Let it be constantly borne in mind that one of the chief aims of the Institute work is the development of local talent, and bringing of the rank and file into close touch with the most successful local men and their methods. Do not depend altogether on the delegates; if home talent is not developed the chief benefit of the Institute system is lost sight of." I am glad to see that the farmers of Dundas have taken the advice of Mr. Hodson, and that a fair portion of our programmes consists of local talent.

Every home should also be a centre of moral and religious training. In the "Cotter's Saturday Night" such training is very beautifully described. The father at the head of the family teaching the children their obligations to their Creator and their fellowmen, and after contemplating such homes scattered over the length and breadth of Scotland, in a glow of patriotic fervor, the poet says: "From scenes like these old Scotia's grandeur springs, that make her loved at home, revered abroad. Princes and lords are but the breath of kings: an honest man's the noblest work of God." The poet well knew that "the homes of the nation are its strongest forts." Let us endeavor to have such homes in this fair Province of Ontario.

As we have just got through the Jubilee year it will not be out of place for us to say something on the loyalty of Canadians. The people of this country were never more united or loyal to Great Britain than to-day. We were all proud of the universally warm welcome given the Canadian Premier at the Jubilee festivities, and of the foremost place which Canada had in that great celebration. The sentiment of Canadians is well expressed in the words of the poet: "Long may the sons of Canada continue as they've been, true to their native land, and faithful to their Queen." And if occasion should rise, we believe the people of this country, without distinction of race or creed or party, are prepared to help defend and maintain the rights of the great Empire of which we form a part. If I have said anything that will lead to the improvement of country homes, or that will convince the young men of to day that there is money to be made on the farm, and that at the same time there is a possibility of the fullest cultivation of social and intellectual life, then I am well repaid, and we may feel that something has been done to check the overcrowding of the cities and of professional life, while at the same time we have lifted farming to a higher plane and those who engage in it to a higher manhood.

HOW TO MAKE HOME ATTRACTIVE.

[By D. Lawrence, Thamesford, Ont.

From natural position and general surroundings some homes are much more easily made attractive than others, but there is a great deal that can be done to beautify every home and make it attractive. In the first place, I think that a house, to have an attractive appearance, should be proportionately built and of a size sufficient for the wants of a moderate family. The design or plan is a matter of taste, and nearly every farmer will have an idea of his own in this respect. The various tints and colors with which the different parts of the woodwork are to be painted have a great deal to do in creating an attractive appearance for a home; even the color of the window shades may very materially enhance or mar the general appearance. The choice of color has to be made a matter of personal selection, as many painters are very deficient in taste. We should take a lesson from the beautiful flowers and see how nicely the colors blend and harmonize.

The arrangement of the lawn and surroundings has much to do in giving the home an attractive appearance. The house should be slightly elevated from the road, but not too much; and in ordinary circumstances from forty to seventy-five feet back from the highway will leave ample ground for a lawn. On this there should be some nice beds of flowers, some well-trimmed evergreens and bushes, and a nice evergreen hedge. There should also be a double row of Norway spruce trees as a wind break on the north and west sides. These should be far enough away from the house to leave room for a small fruit and vegetable garden. When wind-breaks or fruit trees are too near the house, it is very apt to be damp and unhealthy. The garden should contain all sorts of vegetables and small fruits, so that there may be ample variety in the bill of fare; and if the garden is attended to at the proper time and in the proper way it does not require as much work s is generally supposed.

We have thus far tried to deal with the outward appearance of the home, which, although of great importance, is perhaps of secondary consideration to the inmates. The living room, if possible, should face the south or west, and should be the most cheerful room in the house. The windows should contain a selection of healthy flowering and foliage plants. The parlor and dining-room should be connected by folding doors, so that the two rooms can be thrown into one for family gatherings or other social events. On the inside, as well as on the exterior, much of the attractiveness depends on the tasteful selection and arranging of colors. For instance, a certain design and color of carpet might harmonize well and be very attractive when the woodwork and wall paper were of a light shade, while the very same carpet might look out of place where the room had dark woodwork and dark wall-paper. The selection of the carpet, curtains and wall-paper should be made a matter of very careful study, so that they shall all form part of a perfect whole. Much can be done in arranging the framed photos and paintings on the wall with a view to attractiveness. A moulding or rod to hang pictures on is the best, as it can then be more easily placed to suit your taste.

Then, again, to make the home attractive to the inmates it should be very convenient and well arranged. It should certainly contain a bathroom. Every home should also have a musical instrument—perhaps the organ is the best all-round instrument that is to be had—and some of the younger people at least should take music lessons. Another requisite is a small but well selected library of standard works.

Still another point: The young ought to be encouraged to take a personal interest in the work of the farm, and when boys and girls attain a certain age they should be given a fixsd sum of money, in lieu of wages, with which to buy their clothes, etc, or, perhaps better still, give each boy some live stock, say a few sheep, or a calf, or a colt, or perhaps a brood sow, so that it can be their own to take care of and make all they can out of, and if they are pretty successful let them continue, and as a rule it will be found that the money earned in this way will go farther than if it were given out of the parent's hands

While perhaps most persons will agree with the greater part of what I have advanced, I now pass on to where I may look for criticism. Although I know some farmers who have sisters keeping house for them who are really paragons of excellence and are doing everything that can be done on their part to make the home attractive, still, a home, to be a real home, must of necessity have a wife and mother in it. Of course, although every man may have a wife, it is evident that in the practical economy of nature every couple may not have children, yet it is possible very often for the childless to adopt orphan children, and I have the pleasure of knowing young people who were thus adopted doing very much to brighten and make the home attractive. The fact of the matter seems to be that man has been endowed with certain faculties which can only be drawn out and improved by having a wife and family to care for and who will love him in return. Without these the highest standard of attractiveness in the home cannot be reached.

HOW TO MAKE A COUNTRY HOME ATTRACTIVE.

By James Tolton, Walkerton, Ont.

For some years past there has been a good deal said upon the platform and by agricultural writers and others, about the tendency of those born and reared upon farms to leave them for town and city life. Now I am not one of those who would try, by any means, to prevent altogether this movement of the young people from the farms to the towns and cities. For is it not a notable fact that many of the most eminent statesmen, some of the brightest lights in the professions, and many that have succeeded best in other walks in life, have been born and reared upon the farm. I believe in most cases it is better for the young person starting out in life to follow his or her own tastes and inclinations, so long as they are honest and honorable. It is a lamentable fact, however, that many young people have left the farm where they could have earned for themselves comfortable and honorable homes, to be sorely disappointed, if not something worse, in the town or city. If there has been an undue movement by the young from the farm, in my opinion the fault has largely been with the farmers; we have failed to make our homes as attractive as we might have done. It is true that in the past, when clearing the forest from our farms and trying to make homes for ourselves and family, we had but little time to spend or money to procure those things that go a great way to make our homes attractive. But now that time is in a large measure past. In treating of this subject it may be said there are three cardinal principles laid down by which the home may be made attractive and they are these: health, happiness and profit.

I would not say that only in rural life can we have good health, but I will say that in the country, with its pure fresh air and with other requirements that are necessary for that purpose, we are more likely to enjoy good health than in a crowded town or city. No matter how much money or property we may be possessed of—and we may be surrounded by our families and acquaintances—if we do not enjoy good health nor live in a pleasant and attractive home, we will not enjoy happiness. The farmer is not farming, no more than the professional man is practising his profession, for the *fun* of it, but in order that he may have a home for himself and those he loves, and that he may be surrounded with the necessaries as well as some of the luxuries of life, and that he may lay something by in the event of a rainy day or declining years. In order to attain these things it is absolutely necessary that on our farms we should have substantial and attractive buildings, well cultivated and well fenced fields, and generally make our homes attractive.

Now one of the first things to be noted is that the farm should be fenced off into square or rectangular fields, of such uniform size as will best suit the boundaries of the farm and the system of farming we may adopt. The fences should be built in a workman like manner and of the most durable material our circumstances will permit. Then the farm buildings should be built not only to be as durable and convenient as possible but of a neat and architectural design. A farm with convenient and neat buildings, with well cultivated fields of appropriate size, nicely fenced, is not only more attractive, but is more valuable. If from any circumstances it should be desired to be sold, it will realize $5 to $10 per acre more than if the buildings are of no particular design, the fields of no particular shape, fences built in a careless way, and the cultivation done in a slovenly manner. Then again, the farm should not only have some fruit trees, but ornamental trees should also be planted in suitable places. In the Good Book it is written that after God created man He planted a garden for man, and out of the ground He caused to grow every tree that is pleasant to the sight and good for food. It is said there is such a thing as a Thing of Beauty and Joy forever; I think a nice fruit tree comes very near to this. What can surpass, if equal, the beauty and fragrance of an apple tree in bloom, or what can equal the joy of seeing it hanging with golden fruit. There should be some flowers as well as trees. Does not the city gentleman, as soon as he has a house and grounds, no matter how small the grounds, in laying out those grounds devote a portion for a flower garden. The trees, flowers and grounds are mainly what make the attractiveness of the city residences, and they are also the means of making a home in the country attractive.

Means should also be taken to make the inside of the house attractive. It should not be looked upon as only a place for house work, to eat our meals and to sleep in, and if a little amusement is wanted to look for it elsewhere. The walls should be adorned with some pictures and the windows with a few house plants. Some music should be provided—it need not necessarily be an expensive piano; above all, some instructive and entertaining literature should be on the tables, among these should be at least one agricultural periodical.

If the boys and girls upon the farm are allowed to have some things, or perhaps animals, which they can call their own, which they can sell if they choose, and be allowed to expend the proceeds as they choose, it will be the means of creating an interest in the work of the farm. In conclusion: another important matter in inducing the boys and girls to stay on the farm and in making their homes more attractive to them, is not to make the work on the farm a drudgery, but along with the work to allow some time for amusement. All work and no play makes Jack a dull boy, it is said. Teach them to have an aim and object in life that is uplifting, and to excel in their avocation, and set them the example of having respect not only for themselves but for life on the farm. If farmers generally were to pay more attention to what are generally called little things and endeavor to make their homes more attractive along the lines indicated, fewer of the young folks would want to leave the farm for the town or city.

THE IDEAL FARMER.

By J. M. Kaiser, Howlett, Ont.

Farmers' Institute meetings are a great benefit to all those who avail themselves of the privileges of attending. Last year over 125,000 persons attended these meetings, and the aggregate result throughout the Province is very gratifying. The Farmers' Institute system being non political in the strictest sense of the word, it is very unwise to belittle the men who have been selected to speak at the meetings. This has recently been done by partisan politicians not far from here.

A recent American paper says in regard to these Institute meetings, "They are managed and instructed by the best and most practical men and women whose services can be procured. Already all over the country may be seen a gradual improvement in the various lines of work considered at these Institutes—better roads, better buildings, arranged with more regard to comfort and economic labor; better surroundings, the lawns, flower gardens, orchards, more tastefully arranged and intelligently cultivated; better fruit trees, of better varieties and freer from insect depredations; better schools and school buildings; better farming and a closer study of the markets and more knowledge how to realize most from the products grown." What has been said applies with equal force to Ontario.

In presenting my ideal farmer I want you to look at a good all-round man. He is not simply a money-making machine, sacrificing every other interest for the purpose of hoarding up money or increasing his possessions. He is not like the man of whom we have heard in a corn-growing district in the United States, who bought land so that he could raise corn to fatten hogs to get money to buy more land to raise more corn to fatten more hogs to get more money to buy still more land to raise still more corn, and so on to the end of the chapter. We do not judge a man by the size of his farm or by the amount of money he may possess, but rather by his intelligence and general usefulness. As money is needed, he tries to make all he honestly can. If he has a chance to get more land and is able to work it profitably, he will procure it, but he will not neglect other interests. The farm is his home and he makes it attractive and pleasant.

His house need not be showy or built expensively, but it should be confortable and convenient. His outbuildings should have the same characteristics. The farm is kept fertile and the fields well arranged. The fences are kept up and the weeds are kept down, and the ornamental features are not lost sight of. His domestic animals are well cared for so that they will make profitable returns. If he is fortunate enough to have a wife and family, he regards them as his supreme possessions. His wife is not his slave but his equal. She knows all about his financial circumstances and they have one common purse. He does not make any important agreement without making her acquainted with it and obtaining her consent thereto. His children are the objects of his greatest care. If he had no other idea he would make the farm and home attractive for their sake. He will educate them and teach them to work. He will aim to train them socially, morally and religiously. He will show them that plain hard work is honorable. If they have good suits of clothes they will be paid for. If the boys prefer the farming profession he will not object to sending them to an Agricultural College, and he will encourage them to attend Farmers' Institute meetings, read good books and papers. He does not neglect his own training. He knows that the world moves and that if he does not move with it he will be left behind. He qualifies himself so that if he is called upon to fill a public office, as councillor, commissioner or member of parliament, he can do so with credit and efficiency. I have no objection to his taking sides in politics, but, as other professions look after themselves, he should look mainly to the interest of his own calling.

He is a social man and will endeavor to be on good terms with his neighbors. If he borrows anything he will take good care of it, and return it in good time. He pays one hundred cents on the dollar and tries to keep out of debt all he can. He gives a helping hand to his neighbor when needful and will not defame his character. He is a religious man. He realizes that he is an agent and medium through which the Divine mind operates in producing and protecting those forms of vegetable and mineral life which are needed to sustain and perpetuate the human race. But for his agency that field of grass and that field of waving grain would not exist. The spirited horse, the useful cow, the skipping lamb in yonder pasture, would have no being were it not for him. And when he looks at his surrounding on a May morning, the barn-yard merry with life and gay with plumage, the orchard laden with myriads of sweet-scented blossoms, he feels that though he cannot make the sun shine nor the rain descend, yet he knows and feels that he is a co-worker together with God in producing these results. He is a faithful worshiper of Him who has given him so exalted a station.

I have endeavored to present to you, as my ideal farmer, a man who can look upward or downward, backward or forward, intelligently; whose ideas and conversations are not bounded by the ordinary routine of farm life. He knows something about the world in which he lives, its history, its present state and its probable destiny. He has a tolerably good conception of the size of the country in which he lives and its relationship to the other countries of the world. He takes a broad and comprehensive view of things as they are, and is able to converse intelligently with educated people of other professions and callings, and will compare favorable with them. And although he does not clothe himself in purple and fine linen and fare sumptuously every day, his food is good and wholesome and he dresses according to his work. He is a benefactor to his race and when he dies he is missed and regretted.

You will see that I have given more prominence to the intellectual and moral part of his being than to his operations on the farm. I believe, by his good deportment and mental acquirements, he need not feel that he is behind the merchant, doctor, lawyer, or artizan. I have not presented an ideal who is beyond the reach of most of us, but one within a reasonable distance. We all should have an ideal above that which we now are, and by reaching toward it we will become better and more perfect.

SOWING AND REAPING.

By Edgar M. Zavitz, B.A., Coldstream, Ont.

We carelessly farm on and live on as if there was never to come a day of reckoning -a time that will fit a just reward to every endeavorer. We go to the Farmers' Institutes, we read our agricultural papers, and it is not so much knowledge that we are in need of as of some stimulant to arouse to action and the use of the knowledge we have. While you are hunting for one farmer who does things just as well as he knows how, I can count twenty, beginning with myself, who do not. While these men go around talking to one out of every twenty in the audience I want to help the nineteen if possible.

Any sane man knows that a barb-wire fence makes a very poor windbreak, but through sheer neglect and indifference he will leave his old brindle to shiver there through cold, wet nights in late fall, burning fuel worth five cents per pound trying to keep up the heat of life, while the owner is beside the corner grocery store, or in a worse place, complaining of hard times, and lamenting that farming doesn't pay. I want, if possible, to furnish an antidote for this indifference. I want to pour into the will faculty some stimulus that will arouse it to action. And I can conceive of no potion more effective to work that desirable result than a sense of this universal, inviolable law that "whatsoever we sow that shall we also reap." If we fully comprehend the infinitude and the magnitude of that law we would spare no pains in cleaning and recleaning our seed, in tilling to the best possible condition our soil to receive the pure seed and then we could secretly rejoice in thinking "what shall the harvest be." Simple as it may appear it is the talisman to success.

Some people are all the time complaining of bad luck, ignorant of the fact that they are themselves the authors of it.

> "It is not in our stars, but in ourselves
> That we are underlings.

We have heard it said that "eternal vigilance was the price of success." Eternal vigilance to what? The most important part has been left out. Eternal vigilance to the demands of this law of reaping as we sow.

Take it again in our stock. A sense of this law of like begetting like would rid the country of all scrubs and all runts. You say you cannot afford a first-class animal to head your herd or flock, but nature keeps telling you repeatedly, at the birth of every calf and of every lamb, that you cannot afford that scrub.

There was in the past a great complaint about the boys and girls leaving the farm and flocking to the town and city. Thank Providence there is less of that now. What is working this desirable change? Why the sowing we do in surrounding their early years with the comforts and pleasures that may attach to rural life. We are beginning to find out that rural life can be so endeared to the young mind that wherever stern fate drives the man or woman in after years, he will often look back through the gathering tears to the sweet scenes and happy days of childhood on the farm. Whatever of bitter and of sorrow the future may have in store for your boy or girl, fill their young lives as full of innocent pleasures and homely joys that the blessing of retrospect will sweeten the closing scenes of life and perhaps cast forward its light along into the hereafter.

The only thing, above all others, in which a parent should take special pains is the training of their child's mind—that heir of eternity. Look out in time that its mother shall be a virtuous, considerate, wisdom-loving woman. Don't let some city flirt entrap you with her wiles—and *vice versa.* I remember a saying that I believed helped me to my wise choice. "Think that you wisk to win a white soul and you will be unwilling to give less than you bargain for." Remember still our law. It is nowhere more exacting or true te its colors than here. If you marry a negress you need not expect white children. But still, better a negress outwardly than one inwardly. Better little mulattos in skin than mulattos in heart.

Next in the line of education comes the public school teacher. Do not engage one merely because he is cheap. Value virtue as well as brains, for here also—"Just as the twig is bent the tree's inclined." It gives me much satisfaction to observe the growth of our Public Library at Coldstream, affording a great and wholesome counter attraction to the allurements of the city. It is a standing monument of the past sowing of earnest endeavor ; and we are still sowing for future harvests. Through the library we come in touch with our own great writers. About one-half of the volumes in our last consignment were by Canadian authors. You see we are patriotic. But we have assuredly something to be patriotic about. It is gratifying to know, at least for a Canadian, that Canada is doing as much in poetry and almost as much in other literature to-day, as all the United States. Her Klondikes are not all in the line of gold. If Jean Blewett has a rival to the poetic supremacy in America it is perhaps another Canadian—a French-Canadian—in the person of William Henry Drummond.

Let us lose no opportunity in sowing the seeds of patriotism in the minds of the rising generation that they may reap an abiding love for their native land—a land of which they may be justly proud, the better half of this North American continent, stretching its wealth of undulating plains and ore-bearing mountains from Labrador to Vancouver, from thundering Niagara even unto the Aurora Borealis.

THE CULTIVATION OF FLOWERS IN OPEN AIR.

By James E. Orr, Tempo, Ont.

I have always been a lover of nature, and for pleasure have cultivated flowers. I think I have been more than repaid by the kind appreciation of all who have seen my flowers or who have accepted from me bouquets of the beauties of nature. Every year I grow large quantities to give away to churches, to the sick, or to others who will appreciate them, and I have in a long experience found but one or two persons who were not very fond of flowers when full grown and in bloom.

> "Thank God for the beautiful flowers
> That blossom so sweet and so fair,
> They garnish this strange life of ours
> And brighten our paths everywhere."

In this address I do not intend in any way whatever to suggest money-making in growing flowers, as I do not grow them for that purpose. I grow them with the object of making this world of ours better and more beautiful, and the people less selfish and more contented and happy. The more we work and care for flowers the more we love them, and they very quickly seem to appreciate and respond to kind treatment and

> "Pay us more than double
> For all their cost and all their trouble."

The first flowers to bloom in the spring are the bulbs, such as hyacinths, tulips, lilies, etc., which of course must be planted in ground thoroughly prepared the previous fall, and allowed to remain in the ground over winter with a slight covering of straw, leaves, or something of that kind. They may be planted at any time between the first of October and Christmas. Place them in the ground from four to eight inches deep, according to size of bulb. Among the bulbs my favorites are the tulips for their gorgeous colors, their pretty cup-like shape, and their early flowering. They are indeed unrivalled for brilliant effect. The tulip is imported from Holland where they are grown in immense quantities to supply the trade of the world ; and you can with a little trouble and small expense obtain a large amount of the grandest bloom from these old spring favorites. Quickly following the bulbs come some of the old fashioned, hardy perennial plants, such as the cowslip, the pure white achillea, the tall and stately hollyhocks, the many colored pinks, the little violet, the Sweet Williams, and last, but not least, the different varieties of phlox ; these are the most beautiful perennial border plants we know of ; we cannot praise them sufficiently. All of the above-named flowers are easy to grow, and when once established will last a lifetime with very little care, such as covering in winter, pruning, manuring, etc.

And now we come to the spring-flowering bulbs, such as gladioli of brilliant, fascinating and varied colors ; waxy tube-roses of wonderful purity, tall and exquisite dahlias, and grand lilies. All the above can be planted in the garden after the danger of freezing is past, and they will soon be up and will flourish and bloom all summer with very little care. We raise immense quantities of gladioli We plant them in good rich ground in a drill six inches deep opened with a plow, place the bulbs six inches apart, cover nicely, and with a little hoeing and care we had thousands of spikes of the most flaming beauty, from three to five feet long. After blooming, the bulbs should be lifted, dried and stored in a cellar, until required the following spring. The dahlias are grown from tubers which need to be separated like potatoes. They require very rich ground and a large amount of water ; soak them every hour and they will bloom freely. They are lovely in a bouquet with sweet scented geranium and sweet peas.

We now come to the shrubs and roses, but will simply name some of the best, and of course the rose takes first place, followed by the snowball, honeysuckle, syringa, spiræa, and almond ; there are others, but these are good.

We now come to the flowers that are raised from seed, or annuals as they are called. We prepare our ground—rich, dry and mellow—and sow them in open ground about corn planting time. Keep the weeds down and the surface of the soil well stirred with a hoe or rake during the summer. The following varieties I can heartily recommend : First, the aster ; this is the acknowledged queen of autumn bloom. There are a great many different forms of the aster, but all are good. To grow them to perfection mulch the rows just before the blooming and keep well watered. My second annual would be the sweet pea. Sow these very early and keep all bloom removed when fading. This applies to all flowers. Do not try to raise your own seed, as the strength of the flower plant goes to the seed. My third annual is the zinnia, grand and large, easy to grow, fine for bouquets, free to bloom, etc. My fourth is the universal favorite with young and old, the pansy, and we all treasure it as the symbol of modest worth and true affection. My fifth has been a garden favorite for over three hundred years, the good old candytuft. Sow a little of this every few days and you will have flowers in abundance, in fact there should be a succession of sowing all annuals so as to have bloom all the time. My sixth is one of our brightest of annuals, coreopsis, a rapid grower and mass of bloom. My seventh is the balsam, grand and lovely. These are better to be transplanted once or twice. My eighth is the poor man's friend, the indispensable garden flower, pink. It succeeds in any soil. My ninth is the petunia. My tenth is the salpiglossis, large and funnel-shaped blossoms of velvety texture, rich in color and easy to grow. My eleventh is the alysum, as easy to grow as a weed. Then comes verbenas, stocks, poppies, marigold, etc. We must not pass by the mignonette. While not grown as a bloomer it has by its perfume won its way into all gardens, and no plot is complete without it. We will just mention some of the climbers and pass on,—nasturtiums, morning glory, cypress vines, gourds, etc.

I must not close until I have said a few words about the chrysanthemums. These are grown out of doors, but you may have to remove them inside before blooming time. They require plenty of rich earth, lots of water ; do not let all buds develop ; they will last longer than any other flower after being cut. These are among my choicest of fall flowers,—beautiful, profuse, and easily grown ; no other flower need hope to compete with it in its season. In conclusion, do not forget a few everlasting flowers and some ornamental grasses.

FISH CULTURE DEPARTMENT.

THE FARMER AS A TROUT BREEDER.

By William C. Harris, Editor American Angler, Annandale, N.Y.

Farmers are essentially conservative in their business habits, and among all the producing classes are apt to be the slowest in adopting new methods or ideas. We need not look far for the cause of this apathy or seeming indifference to results. The home farm usually produces, in the estimation of the average farmer, all the necessities of life, food and clothing, and if the former is coarse and the latter coarsely spun, long usage of both seems to create contentment and indifference to a betterment of conditions. If the hogs fatten, the cattle keep healthy and the crops duly ripen under the routine of ordinary farm work, many farmers do not look for improved results to be obtained by adopting approved methods through which the crops may be increased and the hours of labor lessened. He does not seem to consider, as he should, the capacity for money-making and comfort-producing of his broad acres, but allows many a chance to pass through which an extra dollar might be made or several be saved by utilizing the waste spots of land and water lying, perhaps, in the neglected fields or corners of his farm. The fruitfulness of his running stream, or half-chooked spring or pond fed by brook or spring, is overlooked, or considered only as adapted to the needs of a few straggling ducks or geese or to be utilized as watering places for the cattle in pasture. Seldom do farmers realize that the handmaid of agriculture is aquaculture—the cultivation of water.

There are few farmers that do not possess running water, a spring or a pond, upon their lands—waters which, when properly cultivated, can be made to produce a four-fold percentage of profit in food for the farm table, or in excess of family needs, in marketable value. An unfailing spring, doubtless used in many cases as an appendage to the dairy, can be utilized for making a small trout preserve which will supply the choicest of fish food for the table, the economy and health of which cannot be disputed. Let us see how this can be done in the simplest and most economical manner, bearing in mind that we are not offering a treatise on trout culture, the details of which would require a volume of printed pages to describe and illustrate.

First, clean out the sources of your main spring and develop any other smaller ones that may be clogged in their outflow, thus getting an unfailing head of water. At a distance of say one hundred feet or more, down stream, guided by the character of the land, dig out or dam up a pen or pond ten feet wide by forty feet in length, and one and a half to two feet in depth. At about fifty feet apart, and down stream, make two additional ponds of similar dimensions, except in depth, which should be from two and a half to three feet, placing at the head of each pond and at the foot of the lower one, an inclined wire screen, the bottom to rest up stream and be so adjusted as to be cleaned readily, and removed when necassary. The raceways between each pond and between the spring and upper pond, being filled with live spring water will become highly ærated in their flow and create a healthier condition for your fish. If the ponds are well shaded so much the better. Put in them water plants that take root freely, the best of which is the ordinary water star-wort, set out several clumps in each pond, by putting them in the centre of a large piece of clay and they will grow closely and rapidly. Water lake weed or wort and water labelia are also good plants and the common water cress is well adapted for the shallow places of the raceways. In building your ponds see that all animals, such as snakes, frogs, newts, eels, etc., are excluded, and that the ponds are not subject to overflow from freshets, which is not likely to happen when ponds are made near the main spring, unless it is in a deep hollow, subject to large and somewhat steep surface drainage. Now that your ponds are finished your next care will be to stock them and plant, feed and protect your fish.

It will be remembered that the first or shallowest pond is intended for the use of the trout when first received, whether fingerlings or yearlings, allowing them the full use of the raceway or spring stream by removing the screen at the head of the pond. The other two ponds are for the older trout. In very cold climates the two lower ponds should, if danger of freezing to the bottom is likely to arise, be made four to five feet deep, and care should be taken to make air holes in the ice if the ponds are frozen solid on the surface. Trout however, during extreme cold, hibernate to a more or less extent, and during the winter season, when the ponds are frozen over, will live without food, although when found rising at the air holes they should be fed. You will plant your fish early in the spring, and if yearlings are used, they will, by the time the heavy winter sets in, be two-year-old trout and capable of taking good care of themselves. It is astonishing how, in the smallest brooks and when the water is apparently frozen solid, trout will live and increase, provided their home is not ravished by man or some unusual disturbing cause.

First, as to stocking: Apply to some of the many fish culturists for several thousand trout fry, or, better still, for a few hundred yearling fish which will produce better and speedier results than many thousands of fry. The yearlings will be found to be of different sizes—three to five inches in length. If they are obtained, place them in the stream, being careful to do so by using a small net made of musquito bar, which you dip gently in the can sent by person from whom you buy and as gently deposit the young fish in the water, distributing them very evenly in the hundred feet of stream above the first pond and at its upper end, from which you have removed the screen. Plant them as late in the day as possible, but do not allow the fish for any period of time to remain in the shipping can, or, if this is unavoidable, put a man at work with a long-handled ladle, in which he will take the water from the can and return it immediately by pouring it back, holding the ladle three or four feet higher than the mouth of the can. This is for the purpose of ærating the water, and must be done frequently until the fish are deposited in the pond or stream. During the transportation of the fish, by wagon, this process will not be necessary, as the jolting of the cans in the vehicle will sufficiently ærate the water. If you fail to obtain the yearling fish from the Commission, and receive the fry or fingerlings only, place all of them in the main spring, enlarging it somewhat if necessary. Observe the same precautions in handling the fry as indicated in the case of yearlings. Let the youngsters remain undisturbed for twenty-four hours, when, if they have not distributed themselves in the lower portions of the raceway or in the pond, remove them gently in the net and distribute them in the waters named.

Secondly, as to feeding: It will be remembered that you are now endeavoring only to rear your fish for the family table, hence the simplest and least expensive methods must be used. The young fry must be fed carefully and frequently, and beef liver has been found to give better results than any other artificial food. It is prepared by being ground finely and then strained through a fine-meshed screen, a thick pudding being made by the addition of water. A small portion, only such amount as the fish will readily eat at a time, is spread upon the water with a feather and they are fed as often as six or eight times a day. As they grow older the quantity of food is increased but the fish are fed less frequently. Such is the method of feeding adopted by fish culturists generally and by the United States Fish Commission, but, as a rule, the fry when delivered, have reached an age when they can take care of themselves if the supply of small water life, such as insects, minute crustacea, etc., is sufficient in the water in which they are planted; in default of which they should be fed regularly, and in case beef liver is not at hand, meat of any kind, treated the same as described for liver, will measurably answer the purpose. The trout, miscalled yearlings, for they are, as a rule, less or more than that age when delivered for planting, can be fed on any kind of animal food, hence when preserved by farmers, these fish can be raised on table refuse of meat, or on sheep plucks, horse flesh, and chicken intestines finely chopped, or upon the curd of milk. Care must be taken, however, that they are not fed in excess, as particles of food left to decay will quickly pollute the water and cause the death of the fish. The head of a sheep, or a piece of any kind of meat unfit for the table, hung over the pond, will produce a supply of taint worms or larvæ which the trout will devour greedily. If it is possible to procure a supply of fresh water shrimp, plant them in the pond. They will multiply in numbers rapidly and will increase the growth and flavor of trout and give them flesh of a rich salmon color. If you have any small springs, the waters of which flow or ooze into your ponds or raceways, open up their sources or beds to permit free running and they will become valuable as breeders of insect life for the trout to feed upon, and the planting of Alder bushes along the banks of your brook or ponds will produce the same conditions.

Protection : Your fish preserve, as described, will only cover an area of a few hundred feet, but constant watchfulness is necessary to protect it from the inroads of birds, snakes, frogs, etc , and in some localities, probably, from trespassers of the fishing fraternity, why, however, will doubtless heed a warning, but the shot gun and the club must be freem used on its other enemies. Keep your domestic web footed fowls away from the streass and ponds, to do which a light fence may be necessary. Frogs and snakes will doubtlely intrude as time passes, hence the value of three ponds which can be run dry alternatere each year, thoroughly cleaned and left a few days, the longer the better, under exposue of the sun's rays and the atmosphere. These ponds will serve another good purpos; Trout are irregular in their growth. When a year old they vary very much in size, some of them are not more than three inches long, a few again are nearly six, and these should be separated and placed, according to size, in different ponds, one of which should be reserved for your trout of two or more years.

Trout spawn when they are only twelve months old, and your little brook and other small tributaries will be used by them for spawning purposes, to promote which you should place here and there a bed of small gravel. They will deposit their egg in water of a few inches in depth, and although scarcely an egg in a thousand comes to maturity when naturally spawned, the act of spawning is a strong instinct and facilities should be afforded for it. If you have a hundred spawning trout they will emit, in the aggregate, each year 60,000 to 70,000 eggs, but not more than seventy-five mature fish will be the outcome—sufficient, however, to keep your spawning stock well up in numbers, provided you keep your fish well fed and protected. Under a reversed condition it will be necessary to replenish your stock of fish every year, which can be done at little or no expense. You will, of course, as your trout multiply, give them a wider range and increase the number of your ponds.

It is astonishing how large a number of mature trout will live and thrive in a very small pond if the proper supply of food and water is furnished them. A remarkable instance of this fact was witnessed by me some years ago. It was also seen by Thaddeus Norris, of angling fame, who described it somewhat as follows : A hotel-keeper living in Hellertown, Pa., had in a trough twenty-four feet long, two feet wide and about eighteen inches deep, six to eight hundred trout, which were from nine to twelve inches long. He had kept as many as twelve hundred in the same trough at one time, and all of them were in a healthy condition. They grew rapidly and got fat on a small quantity of milk curd fed to them once a day. Their flavor was better than that of the wild trout caught fresh from a stream near by. The spring which supplied the pond rose in the garden a few yards above and the entire water from it flowed through a hole only one and a half inches square. The trout seldom died, and instances were known of their breeding in the trough. Thus the farmer will see how practicable it will be for him to have trout ponds with little cost, care and labor, if he possesses the proper supply of water, which should never exceed a temperature of sixty-five degrees.

To artificially breed and raise trout for the market, to an extent that will ensure considerable profit, will require much attention and the outlay of a small amout of money for breeding troughs, hatching boxes and other appurtenances. To describe the methods used in fish culture, the hatching of the eggs, rearing of the fry and shipment of them to market, is beyond the limits of this communication, but the subject has been so thoroughly and exhaustively treated in text books, sold at a low price, that the farmer can intelligently extend his operations by the purchase for a few dollars of all the information needed, when reinforced by his own common sense and ability to profit by observation and experience. One of the cheapest of these books, intended particularly for the use of beginners in artificial trout-breeding, has been recently published by Longmans, Green & Co., of London and New York. The title is "The Trout," by the Marquess of Granby, and the price is five shillings. A more extended work, recognized as authority all over the world, is Livingston Stone's "Domesticated Trout," price $2.50.

In order to obtain a Canadian opinion on this article it was submitted to Mr. W. E. H. Massey, Toronto, who has been very successful in rearing trout in small ponds at Detonia Park Farm. After reading the article Mr. Massey writes:

"In the main I think the article very good, and there is no doubt that on many a farm the culture of trout would be a comparatively simple and easy matter, if the earlier processes are avoided.

"In my mind by far the most helpful suggestion is to purchase yearlings, or rather nine months' old trout in the fall. These can be had from several *private fisheries* at from $25 to $35 per 1,000, and when put into properly prepared ponds or streams and fed with reasonable regularity, not necessarily oftener than twice a day, will develop and grow with a very small percentage of loss. The purchase of very young fry in the spring is attended with many dangers in transportation, and then the ponds or streams will have to be guarded with exceptional care to prevent a very heavy percentage of loss. Our experience leads us to believe that fry should be placed in small pens made of charred wood, and having doors with screens as tops or covers to keep out the natural enemies, would be the wisest way to succeed in rearing the very young ones. It is our experience that when put into open ponds or flumes the losses are heavy. We would say that the ponds should be, in this country, from three to four feet deep. The water would have to flow swiftly and be well ærated to admit of so shallow a pond as two feet. In the winter time a shallow pond must be fed by springs very close to their source coming from the ground at a reasonable temperature, considerably above thirty-two degrees, or the ponds will freeze. The deeper the pond the easier the water is kept cool in the summer time.

"If in arranging the ponds the water can be made to fall from one into another, it is an excellent plan, as it thus ærates the water, which is very helpful to the trout.

"We do not think it necessary to feed the young fry six or eight times a day as suggested. If fed regularly three times a day they will get on nicely. The liver is better boiled in warm water. We have had no experience in feeding on refuse meat to any considerable extent.

"The book recommended at the conclusion of the article, entitled "Domesticated Trout," is by Mr. Livingston Stone, one of the best known U. S. Fish Commissioners."

TROUT CULTURE.

By C H Riggs, L.D.S., Toronto, Ont.

In this article it will be my endeavor to explain, to the best of my ability, the art of trout culture, and to show why, although from my youth up an ardent lover of all legitimate sport, trout-fishing and trout-culture have always held first place in my affections. In the first place, the high standing of the fish as a table delicacy makes its successful culture a direct source of profit; and, secondly, its williness and the methods it adopts for self-preservation makes its capture the most popular of all forms of piscatorial art.

The beginning of trouble for the fish culturist is taking the eggs from the female fish. The utmost care is needed in this task, as his success for the following season depends entirely upon the number taken and the care exerted till the period of hatching. No one knows, except those practically acquainted with the subject, the amount of watchfulness required to bring matters to a successful issue. A trout weighing one pound will yield 1,000 eggs, and if only two eggs from every fish came to maturity our streams would soon be stocked to overflowing. But the trout has enemies whose name is legion, and it is against these foes that the trout-breeder has to keep up a never-ending fight. It has been clearly demonstrated, however, that with proper care a large per cent. can be raised to marketable size. A great factor towards success lies in the method of taking the eggs artificially, a system which has been the means of stocking streams and lakes from one end of the earth to the other; as in the "eyed" state they can be shipped from Canada even to Australia with very little loss.

These eggs, after being taken, are placed in perforated zinc trays, which in turn are put into the hatching pans, with water running over them constantly. This must be the purest of bright spring water, free from all sediment or surface water, and a sure constant supply. About the first of January two little black spots are observed in the centre of each egg. They are then known as "eyed eggs," and may be shipped to any distance with perfect safety. As February approaches some of the eggs open and the little fish appear, to be followed quickly by larger numbers; these are then known as "aliven." They feed upon the fatty matter contained in the egg for six weeks, then this is thrown off, and the work of the trout-raiser is more tedious, as they must be fed regularly and with care.

We have raised between two and three million in one year. This will give some idea of the immense numbers that are handled. We also propagate "black bass," but these are handled in an entirely different manner, although fully as interesting, as the parent fish will remain with the eggs and the little ones until they begin to feed. Then they are taken away and the little ones must care for themselves.

Now, as to means to pursue in starting a trout pond. First and foremost, satisfy yourself that your stream or pond is a suitable one Make sure also that there will be sufficient water throughout the hot days of summer, when the fish so greatly need it. To be successful at least three ponds are required: 1st. The nursery—a small pond above the others. 2nd. A large pond for the yearlings. 3rd. The large fishing pond—the larger the better. It is not necessary to go to the expense of building a hatchery, for a supply of the little fellows can be obtained from some reliable dealer much cheaper than by raising them in a small quantity. The large percentage of loss occurs before the fry are able to detect an enemy, and this must be avoided by a thorough system of screens, both over and around your nursery pond, for enemies, such as frogs, rats, mink, snakes, water beetles and birds, are never-ceasing in their onslaughts when they have once discovered how good a feeding ground a trout pond is.

After having guided them through this perilous stage of their infancy, the necessity for care is appreciably lightened, and the heart of the culturist is gladdened by the sight of thousands of fine healthy young fish.

They commence to take on the bright red and yellow spots about the first of July, and from that time grow rapidly, occasionally reaching ten inches in length in one year. At the end of the year they should be turned into the second pond for their winter quarters and may be fished the following season—but my advice is not to do so, for at this period they are filling out and becoming fine fish indeed. They soon become quite tame and know the keeper well, following him and watching for any eatables which he may from time to time throw to them. At first they should be fed at least three or four times a day, but after the first year once will do, and if your pond be large enough, not at all. Then they become as wild as one could possibly wish, and afford as good sport as though they had never been through the hot house stage.

ENTOMOLOGICAL DEPARTMENT.

INSECTS IN RELATION TO THE FARMER AND FRUIT GROWER.

By M. Burrell, St. Catharines, Ont.

Of the various sciences which are more or less closely related to agriculture, there is hardly one of such vital importance to the farmer and fruit grower as that of entomology; and perhaps there is scarcely any other branch of science less systematically studied by the average agriculturist. It is undoubtedly true that, in order to decrease the cost of production and hold our own in these days of commercial and agricultural depression, we must know something of geology, botany and chemistry, but the study of insect life presents peculiar claims to the farmer. It can be carried on largely by experimental observation; it deals with an endless variety of living forms, and is not only an intensely interesting study, but so closely affects the farmer's pocket on its economic side, that there is no excuse for its neglect.

In the past, farmers have been deterred from a close study of insects for two reasons. One—and this applies to science generally—because of the scientific heminology, the obtrusion of technical phrases, long words, etc., all of which the ordinary farmer very naturally hates. The other, because the whole subject of "bugs" has seemed somewhat contemptible, and practically of little importance. These two stumbling-blocks can, I think, be very easily removed. To take the latter first—"Insect injury to agricultural products," says Dr. J. B. Smith, in the opening words of a recent work, "amounts each year to millions of dollars, and, as a whole, shows a tendency to increase rather than otherwise. It is not only the actual devouring of plant tissue that causes loss; the effect upon the product may be to reduce its grade, or make it more or less unsaleable and unprofitable." The annual loss from insect ravages in the United States alone is certainly not less than $300,000,000; both there and in Canada being probably ten per cent. of all products. In 1882, the hop aphis in England injured that crop to the extent of $13,000,000. In 1857, a third of the wheat crop of Canada was destroyed by the wheat midge. In the state of Illinois, Prof. Forbes puts the annual loss to apple growers from codling moth at from three to four millions of dollars; and so we might multiply statistics indefinitely. Let us remember that each plant has an average of eight insects preying on it; that, with the increasing transportation facilities by sea and land, dangerous pests can be rapidly carried from one country to another; and that with the massing of crops in limited areas, and the heavy increase of the food supply, the insect enemies will quickly multiply. When we think of these things, and reflect for a moment on the vast host of army worms, wire worms, flies, borers, plant lice, bugs, cut-worms, grass hoppers, etc., we must surely admit that this is a subject of paramount importance to the farmer.

As to the first objection, it is more apparent than real. We must not forget that science is not local, but universal, and that it would lead to great confusion if those insects which appear in various parts of the world were not described in terms and by names which could be recognized at once by the men who are endeavoring to trace out their life history.

For the purpose, therefore, of simplifying labor, a system of classification is adopted in which Greek and Latin tongues are employed, so that there can be a scientific language common to students of all nationalities and belonging solely to no one. Then, too, there is an intelligible purpose in view in the use of all these names and phrases, and a knowledge of a few of the leading terms sheds a flood of light on the whole subject and makes it vastly more interesting. Let us take, for instance, some of the great orders into which the insects are divided. The *Lepidoptera*, the *Coleoptera*, *Hemiptera*, *Diptera*, and so on. The word "*ptera*" is the plural of the Greek "*pteron*," a wing, so that the orders are all arranged according to some peculiar wing structure. Looking a little farther, we find that the first part of the word "*Lepidoptera*" is from the Greek "*lepis*," a scale, so that we know that all insects having scales on the wings belong to the *Lepidoptera*. Now, if we take a little of the "fluff" from the wing of a butterfly or moth, and place it under a microscope, we shall see—not "fluff"—but a series of beautiful little scales. Butterflies and moths, therefore, comprise the order of *Lepidoptera*. Similarly, "*koleos*" is Greek for a sheath, and all insects having sheathed wings—hard wing-covers—belong to the *Coleoptera*—or, in plain English, are beetles. The *Diptera*—"double wing"—are the flies and mosquitos—insects having two wings. The order of *Hemiptera* embraces all the true bugs and lice—Greek "*hemi*," half—because in the case of bugs the outer wings are half thick and half membranous—leathery at the base, and almost transparent at the tips. It is easy to see that a marked difference exists between the orders, and that a knowledge of these differences may often prove of great practical benefit to the farmer, as the habits and methods of one order are often totally different to those of another. There is another way in which we can, roughly speaking, divide the insect class, viz., according to two types of mouth structure—the mandibulate, or biting, and the haustellate, or sucking form. The insects of the former type have jaws and bite their food, taking it in a solid form, while the latter have a sort of beak which they insert into the tissue of the plant or animal, taking their food in the liquid form. Bugs, lice, flies, mosquitos, etc., belong to the latter division. This distinction is very important, because it determines the question of how we are to fight some of our worst pests. To biting infects, a poison—arsenic for example—is deadly. The same poison is absolutely useless in the case of a sucking insect, the beak would simply be inserted through the coat of poison and the juice of the plant be safely sucked up. Oxygen is as necessary to insects as it is to man. Insects, however, have no lung system, but, instead, are provided with a series of "spiracles," or breathing pores, along the sides of the body. The knowledge of this fact solves the problem of how to destroy the "suckers," viz, by applying something that will choke up the breathing pores and thus suffocate the enemy.

Another thing that is not understood generally as clearly as it should be, is the fact that insects undergo a number of transformations, which in a broad sense constitute the life history. First, the egg state, then the larval form (whether worm, caterpillar, grub, or maggot,) then the pupal or chrysalis state, and finally the adult insect, either butterfly, beetle, fly, according to the order. One or two points may be noted here. One is that it is chiefly in the larval form that insects are injurious. At that stage the insect is simply a stomach on six legs, insatiate, voracious, and will actually eat two or three times its own weight in twenty-four hours. In the third stage it is usually quiescent and harmless, frequently passing the winter in a cocoon which it has spun for the purpose. In the adult stage the butterflies and beetles do little or no harm, and are comparatively short-lived. Their mission in life is to lay eggs, and they eat very little. The flies are, however, very injurious in the adult stage. It is extremely important to know something of these different changes, because, while the insect is harmless at one stage it may be very destructive at another, and its appearance is so different that recognition of its character is impossible unless one knows the life history. Then, too, the pest may be very easily fought at one time, while in another period of its life eradication is hopeless. When the adult stage is reached growth ceases—that is to say, a butterfly, a beetle, a wasp, never grows; neither does a little fly grow into a big fly; it is simply another species.

With regards to the best methods of exterminating our innumerable insect enemies, the two principal ways are by *good, clean farming* and the *application of insecticides*. Also by protecting insectivorous birds and by due recognition of the beneficial insects.

Beneficial insects. These are of two kinds—the predaceous and parasitic. The parasitic forms are largely four-winged flies, which lay their eggs within the bodies of cutworms, army-worms, etc. When the eggs hatch the small grubs feed on the caterpillar's body, and effectually prevent his transformation to the adult state. Millions of our worst pests are destroyed in this way every year. The predaceous insects, which are beneficial, seize and devour their prey. A familar instance is the fiery ground beetle, a large, black beetle with red dots on the wing-covers, which emits a pungent, unpleasant odor when touched. This beetle lives almost entirely on cut-worms, and is a valuable ally of the market gardeners. Nearly all the "lady birds," or "lady bugs" (they are in fact beetles) are beneficial, feeding extensively on plant lice. Some little knowledge of entomology is, however, necessary to distinguish between friends and foes.

Birds. Nearly all our birds are insectivorous, and an incredible number of our pests are disposed of in this way. There should be a strong and persistent effort made by farmers and fruit growers to protect the birds. The crow is looked upon as an enemy by some, but wrongly. The United States government recently went into the crow question. His life history was worked out and the crops of one thousand crows microscopically examined to ascertain the nature of his food supply all the year round. His economic status has thus been clearly defined, and the evidence went to prove his friendly and helpful relation to the agriculturist. His diet was largely wire worms, white grubs and other insects, and if seed corn is sometimes taken, the remedy is in the farmers' hands. He can mix a little tar with the seed corn. I would except the English sparrow in my remarks. The case against him is clear, and he undoubtedly drives away the swallow, blue bird, and other beneficial visitors. A bounty on dead sparrows would be a step in the right direction

Good Farming. By this I mean the destruction of weeds, the burning of all rubbish and garbage, the removal of all crop remnants as soon as the crop is harvested, the picking up of fallen fruit so that in the late fall and winter nothing shall be on the farm save what rightly belongs there. If these things are not done a shelter and breeding place are simply provided for some of the worst insect enemies. The powers of reproduction are so great that a few adult bugs, lice, moths, beetles, etc., wintered over, will inevitably imply an army of pests the following season. Where fall ploughing is feasible it should be practised. Many injurious insects are then in the pupal state, and are by this practice exposed to conditions fatal to a large percentage of them. The liberal use of whitewash on fences and in stables is an excellent thing. Insects tdo not like lime, and its application will do away with many snug winter qarters. Rotation of cropping also falls under this head An insect that is numerous on one crop may be thus starved out by putting in a crop unsuitable for its food. Where commercial fertilizers have to be purchased, it would be well sometimes to get the potash in the form of kainite. This fertilizer contains not only the fertilizing element potash, but chlorides of magnesium and sodium, and these salts act as insecticides. Dr. J. B. Smith writes me "Kaite is affective against young wire-worms. So also it will kill many of the smaller white grubs. It is more affective on light sandy loams than on the heavier clayey soils." It is also completely efficacious in the case of root lice.

Insecticides, Spraying, and Mechanical Methods. This fourth method of carrying on the war is by far the most important. Mechanical methods include hand-picking, (or catching by nets and other ways), which is still the best way with tent caterpillars, fall webworms, etc., also the use of bandages or the application of some sticky substance, like "dendrolene," to keep out borers, and prevent some of the wingless moths, like the canker worm moth, from crawling up the tree; also the practice of jarring and beating; and the use of devices such as the "hopper dozer" for grasshoppers. As to the spraying of poisons, etc., this is a whole subject by itself, and I can only throw out a few suggestive thoughts. For all leaf-eating insects, Paris green is unquestionably the best remedy. In the case, however, of vegetables, for the cabbage worm for instance, it is well to use pyrethrum, one ounce to two gallons of water. This poison acts both by contact and by being eaten, and is practically harmless to human beings. The pure powder soon loses its strength if not kept in an air tight receptacle. Hellebore is also a useful poison for the pear slug and currant worm. It is both a contact and stomach poison, but not so dangerous to human life as Paris green. Kerosene emulsion is the principal remedy for the various sucking insects, bugs, lice, etc. The application must be thorough or the lice will be weakened but not killed. Diluted with ten parts of water it is fatal to all green lice but the blacker species will require a stronger mixture—six to eight parts of water. For the various "scale" lice, such as the oyster-shell bark louse and San Jose scale, a wash made of whale oil soap, two pounds to a gallon of water, is completely effective, and can be applied any time from late fall to spring.

I may say finally that the most importont thing of all is to begin the fight soon enough. Insects increase with such fearful rapidity that if breeding is allowed to go on unchecked, even for a few days, the fight is hopeless. This is especially true of plant lice, a single pair producing millions in a few short generations. It is also extremely important to do the work thoroughly. In the case of the codling moth, army worm, and many other bad pests, it is the second brood that does the most serious injury. Destroy the first batch and the difficulty is ended. Do not wait; at the first sign of danger "carry the war into Africa."

INSECT LIFE IN RELATION TO THE FARM.

By Wm. Lochhead, B.A., M.Sc, Professor of Biology and Geology, Ontario Agricultural College, Guelph, Ont.

Why Farmers are taking an increased interest in Insect Life.

That the farming community is taking an increased interest in insects is apparent to all who have attended the Farmers' Institutes during the last three or four years.

There are two reasons for this increase of interest: (1) The conviction that the entomologists of the country are practical men who are employing their scientific knowledge for the destruction of insect pests; and (2) the losses caused by insects have become so apparent that even the most careless observer acknowledges that insects do play a very important part in the operations of a farm. Statistics have great weight, more especially when the losses are shown to amount to millions of dollars annually—*one-tenth* of the total value of the agricultural products. Facts are forthcoming which convince even the most skeptical that the new scientific remedies have been the outcome of long, laborious years of study, carried on by men who were uninfluenced by pecuniary rewards. The talks given by the delegates to the Farmers' Institutes have been the chief means of bringing home to the minds of the masses of the farmers the conviction that modern methods have worked wonders.

Why Farmers should take an interest in Insect Life.

(1) Farming has come to be a profession, and in these days of small margins, in many cases knowledge or ignorance of methods of checking the growth of insect pests means success or failure. An up-to-date farmer will do everything in his power to prevent a great loss which can be checked by proper methods. This special knowledge is not difficult to acquire, for the Departments of Agriculture in both the Province and the Dominion are only too pleased to assist the farmer who wants assistance. Timely bulletins are distributed liberally, and the Farmers' Institutes bring specialists directly into contact with the person needing help.

(2) There are beneficial as well as injurious insects. While the farmer may take full advantage of the liberality of the Governments, he should be familiar with both the common noxious and beneficial insects in order to obtain the best results of his work. He would be foolish indeed to destroy every insect that came in his way, for there are many valuable insects which prey upon other injurious insects. Contrary to popular belief, the number of insects which are decidedly injurious to the farmer is very small compared with the total number which is to be found in any given locality.

(3) It is a well-known fact that insects are perhaps the most important agents in the cross-fertilization of plants. As a rule flowers that are colored, and have an odor, are fertilized by insects, such as bees, wasps, flies, moths and beetles, and many are the special contrivances by which plants secure a transfer of pollen from one plant to another by means of insects. Our clover seed crop is secured by insects; the example furnished Darwin with his notable illustration of the inter-relationship of plants and animals, when he stated that the amount of wild honey is dependent upon the number of cats kept about a farm-house.

(4) Recent studies have shown that the "pollen supply is a most important factor in the production of large and symmetrical fruits." The pulp of the strawberry is scanty where the achems or pits fail to appear on account of non-fertilization. Apples and tomatoes become lobsided and irregular when some of the carpels fail to develop seeds. Bunches of grapes, too, have been found to be larger when fertilized than when unfertilized.

Again, when more pollen has been applied than is necessary for complete fertilization, very often very large fruits results. "It is now believed that pollen often exerts a secondary influence in stimulating the development of the pericarp;" and most pollen is conveyed by insects.

What Insects are Injurious. The late Prof. Panton gave, in last report, a very able descriptive list of insects which are injurious to the crops, to which list I would refer all who are interested. The remedies are also given very concisely after the description of the insect.

At some future time I may take the liberty of modifying the list made by Prof. Panton by giving first the character of the injury, then the insect causing the injury, and finally the remedy. In this presentation I would be following the method adopted by Prof. Hopkins of the West Virginia Experiment Station.

What Insects are Beneficial. There are four classes of insects which might come under this heading:

(1) *Predaceous Insects*, comprising *lady-beetles*, *ground-beetles*, *rove-beetles*, *tiger-beetles*, *soldier-bugs*, *aphis-lions*, *ant-lions*, *syrphus-larvæ*, *robber-flies*, etc.

(2) *Parasitic Insects*, comprising *tachnia flies*, which are parasitic upon larvæ of moths, upon grasshoppers, crickets, beetles; *ichneumous*—parasitic upon many of our most injurious caterpillars. "It may be safely said that plant-lice would be among the very worst insect enemies of plants were it not for their numerous predaceous and parasitic enemies"

(3) *Scavenger Insects*, which feed upon decaying animal and vegetable matter. The larvæ of many of these are called *maggots* which assist in removing dead matter and in transforming it so that it can return to the soil and be assimilated by plants.

(4) *Honey and Pollen conveying Insects.* These are beneficial in so far as they aid in the great task of pollenation. Bees and wasps belong to this class.

It is the duty of every agriculturist to be able to identify these allies in the work of extermination of pests. The beneficial insects should be "protected, encoraged and utilized as best we can, remembering that in order for an insect enemy of a plant to furnish food for friendly insects, animals, etc., *it must* itself have food. Thus the plant may be destroyed or ruined before our friendly allies appear."

What Animals are Enemies of Insects. (1) *Poultry* destroy large numbers of grubs, worms, beetles and grasshoppers.

(2) *Herds* may be used to eat down crops attacked with bad insects.

(3) *Birds*, such as the swallow, night-hawk, king-bird, wood-pecker, blue-bird, highholder, blackbird, sparrow and others should be treated kindly for the services they render.

(4) *Toads*, *Hogs* and *Skunks* are good insect-eaters

What Remedies may be Used. Remedies may be classed as (1) *Preventives*, (2) *Active Remedies.*

Much can be done in combatting injurious insects by *clean farming* and *proper attention* to *manuring*, *draining*, *healthy seed*, and *careful cultivation.* It is a well known fact that very seldom will plant-lice attack strong, healthy, vigorous plants. "Weak plants are a menace to healthy ones." Many pests breed in weeds, and some pass the winter stage in old roots, etc. Hence it is the part of a cereful farmer to deprive the insects of breeding and resting places by getting rid of all infected fruits, vegetables and rubbish heaps.

A proper rotation of crops is an excellent preventive of the spread of insect pests, by developing unfavorable conditions. For example, insects which infest animals may be deprived of their proper food by the growth of biennials or perennials.

Late fall plowing has proved very advantageous in many cases in that the larvæ and eggs of many insects were exposed to the winter frosts.

The active remedies are familiar to most farmers. In general, for killing purposes, insects may be divided into two classes.

(1) Insects that can be poisoned. These have biting mouth parts, and hence can be poisoned by dusting poison on their food. The chief poisons used are Paris green, London purple and corrosive sublimate.

(2) Insects that are killed by having poisons come in contact with their bodies. These have sucking mouth parts, and get their food from the plant by inserting a probe and sucking the juices. The chief poisons used are kerosene emulsion, tobacco solution, pyrethrum, whale oil soap and potash soap.

Some farmers err grievously in their attitude toward spraying. Some how or other they have come to think that mildew and insect pests can be no more prevented than drouth.

Plant-lice can be checked by tobacco solution or kerosene emulsion; *leaf-eating insects* by Paris green or London purple; *granary insects* by a careful use of carbon bisulphide; *currant-worms* with hellebore; *borers* and *bark lice* by carbolic acid emulsion or an alkaline wash of washing soda and soft soap

Summary.

What are the Chief Requisites of Success. (1) Thorough cultivation; (2) proper rotation of crops; (3) clean farming; (4) fertile soil, good draining; (5) a knowledge of injurious and beneficial insects; (6) their methods of injury and attack; (7) the prompt application of the proper remedy.

SUCCESS IN BEE-KEEPING.

By R. F. Holtermann, Brantford, Ont.

The old idea that anyone can keep bees, and that it only requires the money to buy the bees and time to take the honey away from the bees has long been exploded. In almost every part of our Province we meet men and women who have tried to keep bees and have utterly failed or have made no money out of them. Such evidence to prove that there is no money in bees is of no more value than the evidence that there is no money in dairying and stock raising because a farmer who neglects his stock and perhaps has to steady them as they pass out of the stable in the spring of the year, cannot make it pay. Nor are these embryo bee-keepers altogether to blame. There have in the past been those who have circulated the idea that neither skill, experience nor time is required to make a success of bee-keeping, and the result has been that many who had intelligence, were energetic and industrious, failed because they were not put upon their guard, and they stumbled over unforseen difficulties. Bee-keeping has very strong claims as a branch of the farm in Ontario, and, as in every other department of the farm, the returns are largely according to the care, attention and time properly expended upon it. Anyone desiring to engage in bee keeping should get a good work on bees, such as "Langstroth on the Honey Bee," or "The A B C of Bee Culture," by Root. Study these works well and then begin in a small way. Never buy bees in the fall of the year; begin in spring. Buy from a reliable man, have them moved or delivered about the third week in May before they swarm, and when you have the honey flow and profits before you.

Get well-constructed hives, combs built on foundation and the hives strong in bees, not heavy with honey but strong in numbers. The strain is of value, but the above anyone can select. Strong colonies from the first day of the year to the last is the foundation of successful bee-keeping.

Beginners and many older bee-keepers fail in making bee-keeping profitable, because they do not keep their worker forces together Early and strong swarms are desirable, but never sacrifice strength for early swarms. Upper stories should be put upon the brood chamber when the latter is getting crowded and not after the bees swarm. To only use one upper storey is very poor economy. The bees get the swarming impulse when the hive is crowded and the bees begin to feel uncomfortable. When only one comb honey super is used, where are the bees going to store honey when they give the finishing touches to the sections the super contains? They have to remain idle in the hive, and they not only get the swarming impulse but they have to allow the honey flow to go by without gathering it. Is a farmer foolish who allows his wheat to stand and shell out in the field? If so, the bee-keeper is equally foolish to stint the storage capacity of his hive.

It takes so many bees to do the work of the hive and gather the honey necessary for their daily use. The bees over and above that number are those which are to give the returns to the bee-keeper, but if they are continually dividing up by swarming the bee-keeper may get no returns at all.

Swarming may be reduced by means of ventilation, giving room in time, and shading the hive. Every hive should have an entrance half an inch deep across the front of the hive, and the bottom board should be loose, so that it can be lowered, giving additional ventilation. I cannot go into the matter now, but for comb honey no ventilation should be allowed from the top of the hive. The choicest article cannot be secured in this way. The importance of giving room in time has already been mentioned. No hive for summer use should be painted a dark color, and it should be shaded during the heat of the day after there is a high enough temperature to make the bees uncomfortable.

As to swarming, there is no doubt that a beginner has a difficulty here. He is apt not to see the swarm issue as it will not pay to have anyone constantly watch a few swarms. We have, however, entirely overcome the risk of losing swarms by the use of the *Queen Trap.* It is made with perforated metal, and the queen, being a little larger than the worker bees, is trapped as the swarm issues, and the bees without a queen return to the hive. The queen should be looked for every day, especially towards evening. If the hive has swarmed she will be in the top of the trap and the old hive should be moved aside, the new hive put on a new stand, and about three-quarters of the bees shaken into the new hive, the old Queen allowed to run in with the bees and the old supers put upon the new hive.

Strong swarms with a queen and plenty of stores will lay the foundation to successful wintering, and under certain and known conditions bees can be wintered with as great certainty as any of the stock of the farm.

ORNITHOLOGICAL DEPARTMENT.

BIRDS IN RELATION TO AGRICULTURE.

By Charles W. Nash, Toronto, Ont.

The agriculturist in the Province of Ontario has annually to suffer great loss from the depredations of two classes of enemies, both individually insignificant but, by reason of their numbers, very formidable. These are insects and small rodents, chief among the latter being rats and all the animals usually classed as mice.

It is very difficult to make anything like a correct estimate of the average damage inflicted upon the farmer by these little animals, but every man engaged in farming knows by sad experience that he continually suffers from their work. The enormous amount of grain they destroy, and the young trees girdled and killed by them are visible to every one; but the creatures themselves, owing to their nocturnal habits and secretive lives, are comparatively seldom seen. Their enormous increase and consequent capacity for serious mischief is, of course, owing to the fact that man has interfered seriously with the balance of nature, and has thoughtlessly, perhaps, destroyed the principal natural enemies of these creatures. Man himself is almost powerless to stop their ravages to any very great extent. The constant exercise of his ingenuity in trapping and so forth results in very little and occupies his time to no purpose. The natural enemies of these animals are gifted with special faculties for their destruction, and so are able to cope with them. Chief among the enemies of this class of farm pests, and the only ones we shall consider now, are the birds of prey. These birds are wonderfully provided by nature with the means to fulfil their part in maintaining the correct balance between the small rodents and the vegetable kingdom. They are in a manner nature's police, and if not destroyed by man would so keep down the numbers of these small four-footed thieves that their plundering would be scarcely noticeable. Our birds of prey may be roughly divided into two classes, the hawks and the owls, the first feeding by day and the other by night. Of the eagles we need say but little. They are now so rarely found in the civilized districts that their influence for good or ill is practically nothing, except upon the game, and of that no doubt they destroy a large quantity.

Hawks.

Of the hawks there are eleven species occurring regularly in this Province, in greater or less abundance every season. These are the Marsh Hawk, Sharp-shinned Hawk. Cooper's Hawk, Goshawk, Red-tailed Hawk, Red-shouldered Hawk, Broad-winged Hawk, Rough-legged Hawk, Duck Hawk, Pigeon Hawk, and Sparrow Hawk; there are two or three others, but they are only occasional visitors. Of these eleven, the Sharp-shinned Hawk, Cooper's hawk, Gos-hawk, Duck Hawk and Pigeon Hawk are the species which occasionally make raids upon the poultry yards, and which at all times seem to prefer feathered game to either fur or insects; these should, therefore, be shot whenever the opportunity is given. The Sharp-shinned Hawk and Cooper's Hawk are the two species which most frequently attack the poultry. They are both small hawks, but make up for their lack of size by their boldness and dexterity. It is but seldom that they attack a full grown fowl, but if they once find an accessible lot of chickens they will continue to visit the flock until they have taken them all, or are killed in the attempt to do so. The mischief done by these two species has been the principal cause of the prejudice existing in the farmer's mind against all the hawk tribe, and is usually given as the excuse for the slaughter of all the valuable species whose constant work inures to man's benefit. The food of the Duck Hawk and the Pigeon Hawk consists chiefly of wild birds, but they rarely visit the farms, their usual resort being the marshes and shores of lakes frequented by water fowl

The Pigeon Hawk is not so named because it has any preference for pigeons, either wild or domestic, but because it slightly resembles a pigeon in shape, both when on the wing and when at rest.

The Goshawk fortunately does not visit the cultivated portions of Ontario in any numbers regularly; it is a winter visitor only, and rather an expensive one to entertain when it does come. The winter of 1896 and 1897 was one of the seasons in which it was particularly abundant throughout southern Ontario, and poultry owners suffered greatly from its destructive powers in consequence. This hawk is a large, powerful bird, quite capable of killing and carrying off a full grown hen. The adult is dark, slaty blue above, blackish on the head, the breast and belly barred pale slate and white with sharp black streaks; the young, dark brown above, white beneath with oblong brown spots; length, about two feet. Owing to its boldness and strength it is capable of doing a good deal of damage, and should consequently be killed wherever seen. As previously stated, this hawk only occurs in winter, and therefore it is not likely to be mistaken for any of the hawks whose food habits are of benefit to mankind. As a general rule, if a hawk is seen about the farm yard during the winter it is safe to assume that it is there for no good purpose, and the gun should be brought into requisition at once, as all our beneficial hawks migrate southward when cold weather sets in.

From the above species, all of which are undoubtedly injurious to the interests of the agriculturist by reason of the destruction they work in the poultry yard and amongst our insectivorous wild birds, we turn to the remaining six species of the hawks frequenting this Province, every one of which spends the greater part of its time and devotes its energies to work the destruction of the animals and insects which are known to be amongst the greatest pests the farmer has to contend with; these are the Marsh Hawk, Red-tailed Hawk, Red-shouldered Hawk, Broad-winged Hawk, Rough-legged Hawk and Sparrow Hawk.

Nearly everyone knows the Marsh Hawk and has seen it gracefully skimming over the low meadows, occasionally hanging poised over one spot for a second or two and then dropping down into the long grass; this drop generally means the death of a meadow mouse, some times, but more rarely, a frog; of these two creatures its food principally consists, and the number of meadow mice destroyed by each of these birds in a season must be something enormous. As many as eight have been found in the stomach of one of these hawks, and four or five quite frequently. The hawk's digestion is very rapid and their hunting and feeding is continued with but few intermissions from daylight until dark; how many mice each bird would take on the average each day would be difficult to state exactly, but it is safe to assume that at least six would be required; now multiply that by the vast army of these Hawks that resort to this Province and the total number of mice destroyed would be amazing; and then against this good work oonstantly going on there is no damage to be set off. Not one instance, in thirty years' observation of this bird's habits has ever come to the writers knowledge of their having attacked a single domestic fowl. It does sometimes take a meal off a dead duck or other bird it may find lying in the marshes, but it is doubtful if it ever kills for itself a bird of any kind, at any rate in this Province. Every farmer and every sportsman in the land should do his utmost for the protection of this bird. Unfortunately they are constantly destroyed by persons who are ignorant of the good they do, and thousands are killed every autumn by mischievous people who must shoot at everything they see that has life in it. If people who wantonly shoot hawks would sometimes look at the stomach contents of the birds they kill they would soon be convinced of the wrong they were doing and would perhaps exercise sufficient common sense to refrain from continuing the evil practice.

For the sake of brevity the Red-tailed Hawk, Red-shouldered Hawk, and Broad-winged Hawk may be considered together. These three common species are usually known as "Hen Hawks." Why, however, it would be difficult to say. They are all fairly large, slow, heavy flying birds, whose food consists principally of mice, squirrels, toads, frogs, and snakes; very rarely do they ever take a bird of any kind. In fact it would be extremely difficult for them to do so, unless the bird was very young, or injured seriously.

They will when pressed by hunger feed on carrion, but the staple article of diet with them is meadow mice and squirrels, varied, as before stated, by toads, frogs and snakes, besides grasshoppers and other insects.

I have specially omitted from this group, to which it really belongs, the Rough-legged Hawk. This is done purposely, because the great value of the species to the farmer should be particularly pointed out, the bird having been most unjustly persecuted. It is the largest of the Canadian hawks and one that deserves the greatest consideration and protection from every man having an interest in agriculture. It can be safely said that this so-called "Hen Hawk" has never killed a head of poultry at any time, nor do they ever kill birds of any sort. During the fall of 1895 these hawks were very abundant in Southern Ontario and large numbers were killed. I obtained all the bodies I could for the purpose of investigating the contents of their stomachs, and I spent much time in watching their habits whilst feeding. All day long, every day from the first of October of that year to November 28th, the birds were constantly passing slowly along through Southern Ontario, feeding as they went, and not one fowl was taken or attacked by them anywhere, as far as I could learn, and I made enquiries from poultry keepers wherever I could. In all, 32 specimens were examined by me, and the result corroborated my experience during the last thirty years. In one stomach I found a frog, in another the flesh of a musk rat—taken from a pile of bodies of these creatures which had been thrown together in Ashbridge's Marsh. Another stomach was filled with large grasshoppers, and the rest contained mice, and nothing but mice, or traces of them, ranging in quantity from a little fur and a few bones to seven whole ones. From this it can be judged whether or not the Rough-legged Hawk is the friend of the farmer.

The attention of the Department of Agriculture at Washington was some time ago called to the fact that mice and other destructive rodents were largely increasing throughout the United States and it was suggested that the constant destruction of the hawks and owls was the reason for it. In consequence of this the Department placed the matter in the hands of Dr. Merriam and Dr. Fisher, two of the leading ornithologists of America, with instructions to prepare a report on the subject. This they have done and the result of their investigation which I shall give at the end of this chapter shows conclusively that all the hawks which I have referred to as being beneficial to agriculture are of the greatest possible value in ridding us of enormous numbers of destructive animals, and that they are practically innocent of the commonly urged charge against them, of poultry killing.

There is only one more species of hawk to be considered, that is the beautiful little Sparrow Hawk, probably the commonest of all our hawks, and which may be distinguished from any of the others by its smaller size and red back. It may be constantly seen hovering over fields in Ontario, all through the summer, for it breeds with us, raising its young in a convenient hole in a tree, frequently choosing one that has been deserted by one of the large woodpeckers. The very small size of this bird precludes the idea that it can take a full grown fowl or even a pigeon and I have never known in my own experience that it has even taken a young chicken. Its principal food consists of mice and grasshoppers, of both of which it consumes immense quantities, but it does occasionally take wild birds, more particularly those which frequent the open fields and skulk in the grass or run about the stubbles. The birds taken by this species are, however, so few in number compared to the number of mice which it destroys, and the good it does in reducing the swarms of grasshoppers which infest our fields that we may well forgive its slight trespasses, the balance of good over evil being so great that the birds deserve our protection. The following shows the result of the investigation made by Dr. Fisher at the request of the Department of Agriculture of the United States:

Red-tailed Hawk. 562 stomachs examined:

54 contained poultry or game birds; 51, other birds; 409, mice and other animals; 37, reptiles, etc.; 47, insects; 9, crawfish, etc.; 13, offal; and 89 were empty.

Red-shouldered Hawk. 220 stomachs were examined:

3 contained poultry: 12, other birds; 142, mice and other mammals; 59, reptiles, etc.; 109, insects; 7, crawfish; 2, offal; 3, fish; and 14 were empty.

Broad-winged Hawk. 65 stomachs examined:

2 contained small birds; 28, mice and other mammals; 24, reptiles, etc.; 32, insects, etc.; 4 crawfish; and 7 were empty.

Rough-legged Hawk. 49 stomachs examined:

45 contained mice and other mammals; 1, lizards; 1, insects; and 4 were empty.

Sparrow Hawk. 320 stomachs examined:

1 contained a quail; 53, other birds; 101, mice and other mammals; 12, reptiles, etc.; 244, insects, etc.; and 2 were empty.

Marsh Hawk. 124 stomachs examined:

7 contained poultry or game birds; 34, other birds; 79, mice and other mammals; 9, reptiles, etc.; 14 insects; and 8 were empty.

Thus it can be seen that of the 49 stomachs of the Rough-legged Hawk examined by Dr. Fisher and the 32 examined by me, in 1895, not one contained a trace of any domestic fowl and nearly everyone contained mice. Yet many people persist in calling this bird the "Big Hen Hawk" and in treating it as an enemy, when both by law and public opinion it should be protected by every possible means. The statement as to all the other species that I have referred to as beneficial is equally corroborated by my own experience and shows hows how well entitled these birds are to consideration at our hands instead of the persecution they usually meet.

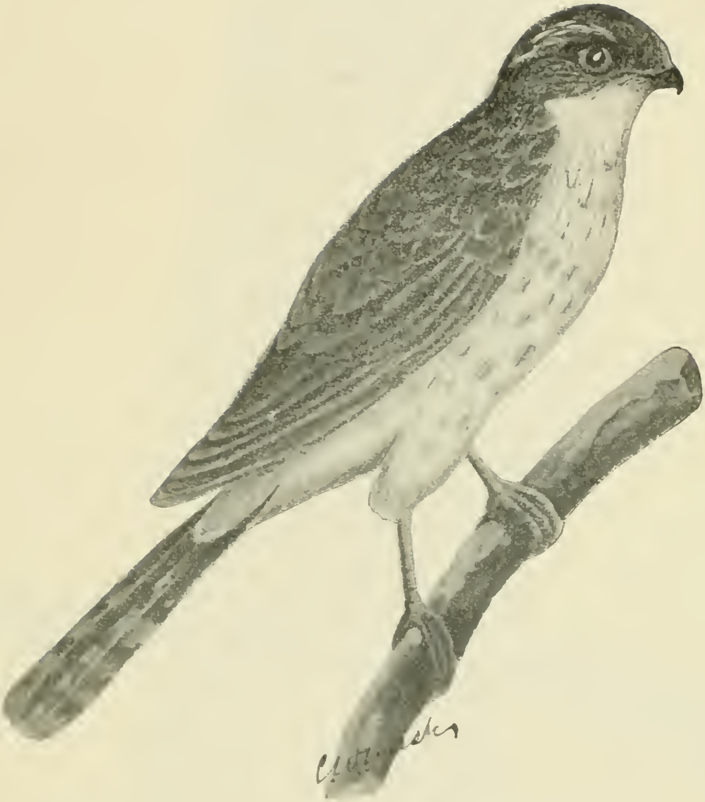
OWLS.

For some reason owls have always been treated with a certain amount of ridicule and contempt. In the minds of the ignorant and superstitious they were associated with cats and witches, and were supposed to possess a certain amount of influence with the latter, whose orgies they entered into with a good deal of spirit. In mythology, however, this bird was treated respectfully. Minerva, the goddess of wisdom, selected it as her attendant, and "as wise as an owl" has passed into a proverb by reason thereof.

Most of the owls seen in the day-time appear to be stupid, clumsy and inert creatures, as they sit winking and blinking in the unaccustomed light, striving as much as possible to shade their wonderful eyes from the too-powerful rays; but see these birds at dusk and after—what a transformation takes place. They are then as alert as any hawk; their soft plumage enables them to skim noiselessly around our farm buildings and over the fields in search of their food. Unlucky then is the mouse or rat that ventures to show itself, or even utter a squeak from its hiding place in the grass, (for an owl's ears are as wonderfully constructed as its eyes, and their hearing is as acute as their sight.) The fate of that mouse will be sealed and it will vex the farmer no more.

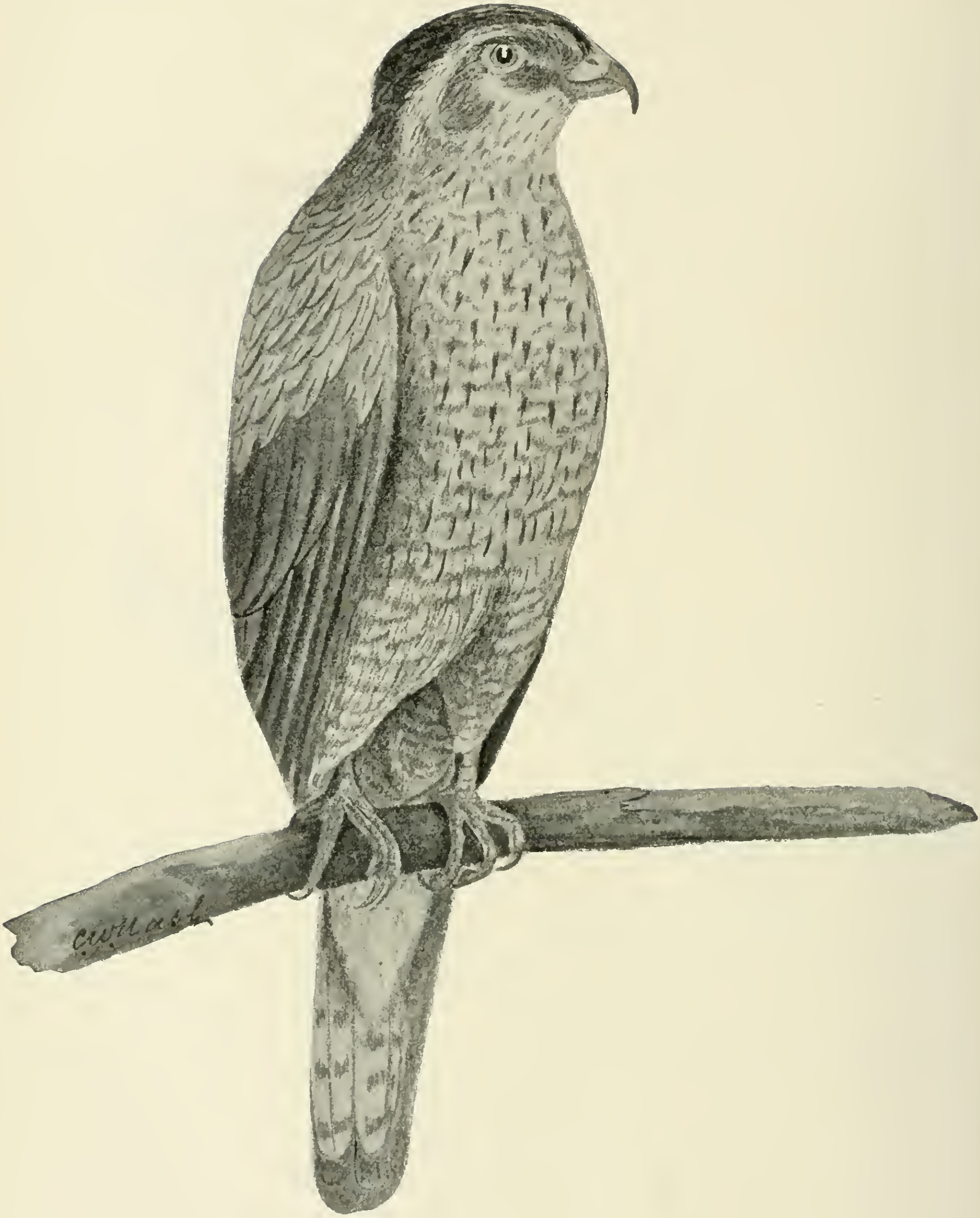
Some of the owls however, are day feeders—the Snowy Owl and the Hawk Owl I think entirely so—while the Great Horned Owl seems to be almost as active on dull days as at night; and whether the day be bright or dull these birds can always see well enough to take care of themselves and keep out of the range of a gun.

In the cultivated portions of the Province of Ontario we have five species of owls that may be treated here as residents. They are not strictly so, as there is a certain migratory movement amongst them, caused probably by the failure or abundance of their food supply, which may cause them to either leave certain districts for a time or gather there in larger numbers than usual. Many instances are on record of plagues of mice having been stayed and the trouble removed by the arrival on the infested spot of large numbers of owls; these birds rapidly killed off the mice and then scattered again. Our resident species are the Great Horned Owl, Long-eared Owl, Short-eared Owl, Barred Owl. Of these the Great Horned Owl, or "Cat Owl," as it is often called, is the only one I have ever known to attack poultry, and it can work havoc amongst them if they are left out to roost in unpro-



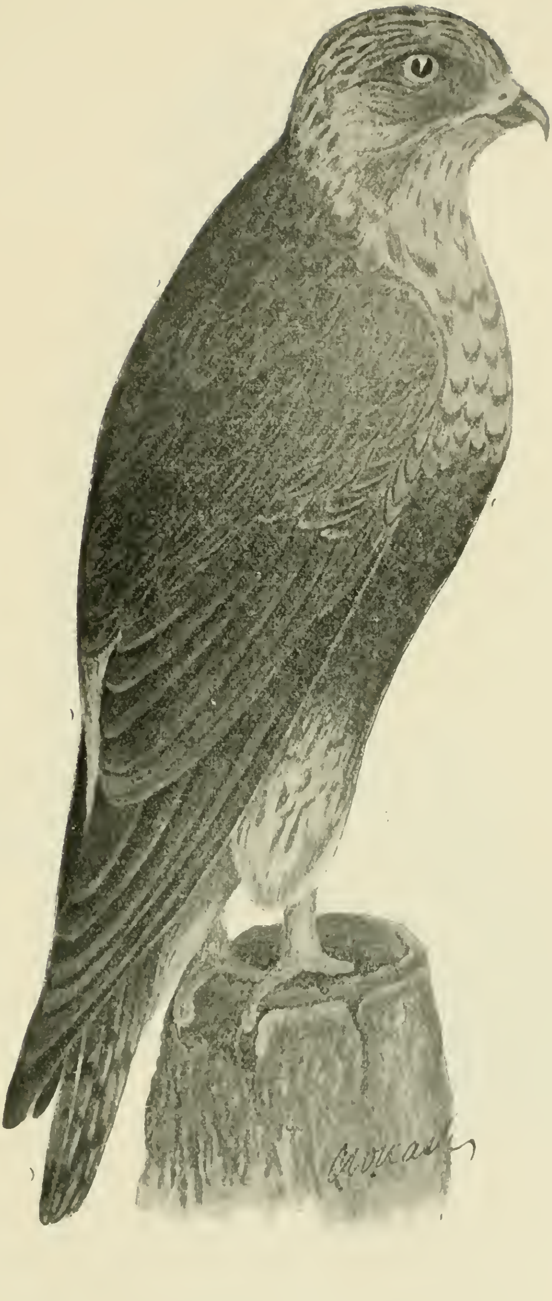
SHARP-SHINNED HAWK
Accipiter velox

(A)



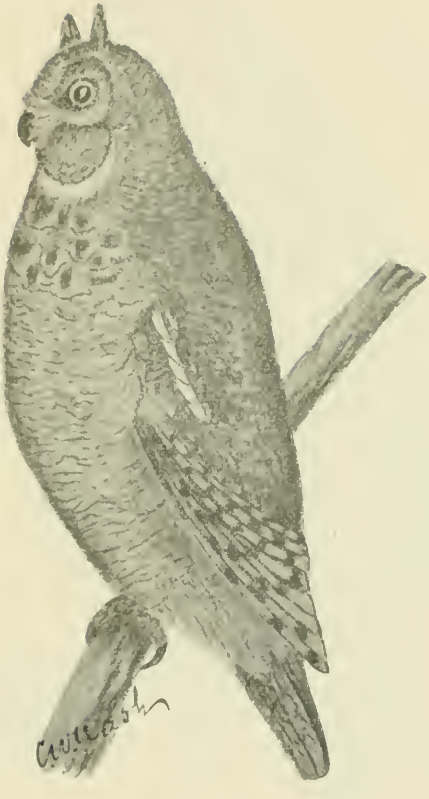
Goshawk

Accipiter atricapillus

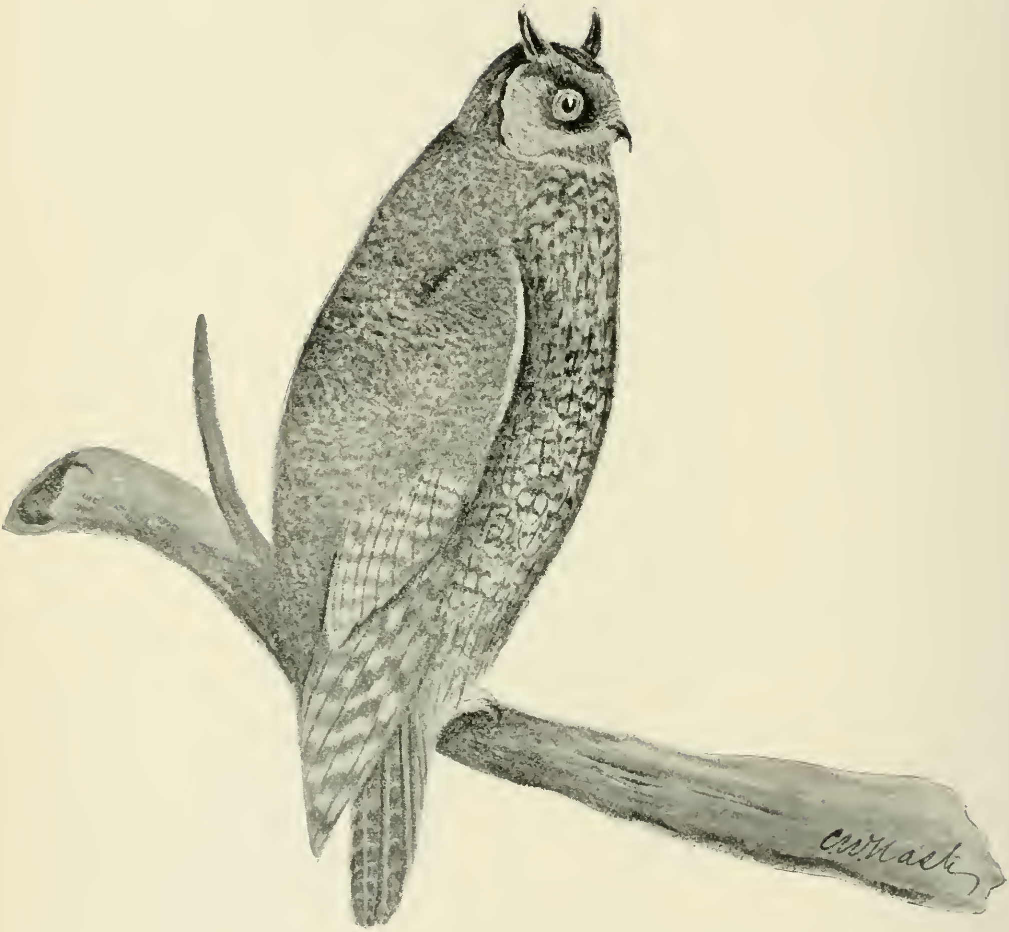


Rough-legged Hawk
Archibuteo lagopus sancti-johannis

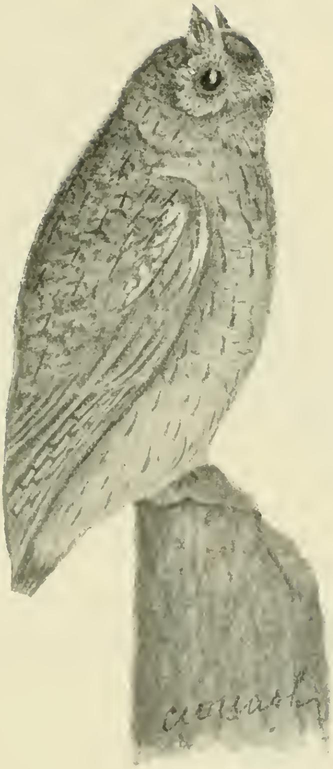
Sparrow Hawk
Falco sparverius



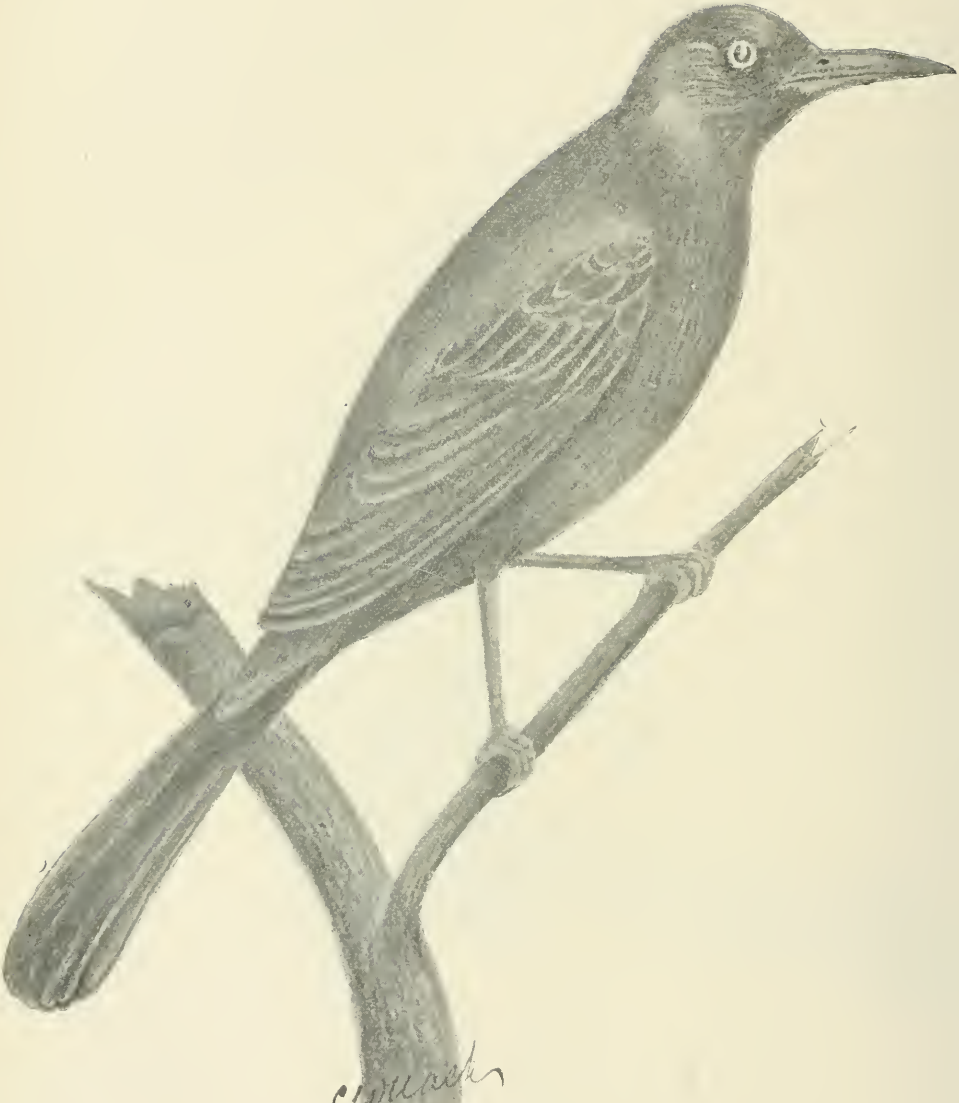
Great Horned Owl
Bubo virginianus



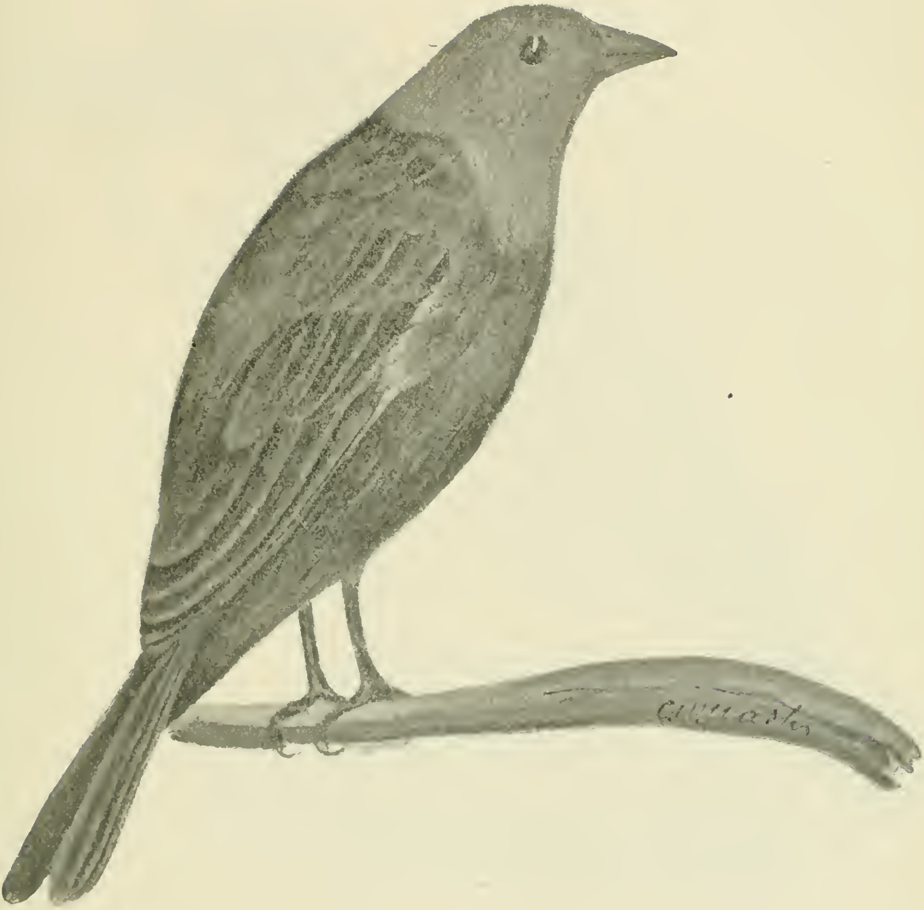
Long-eared Owl
Asio wilsonianus



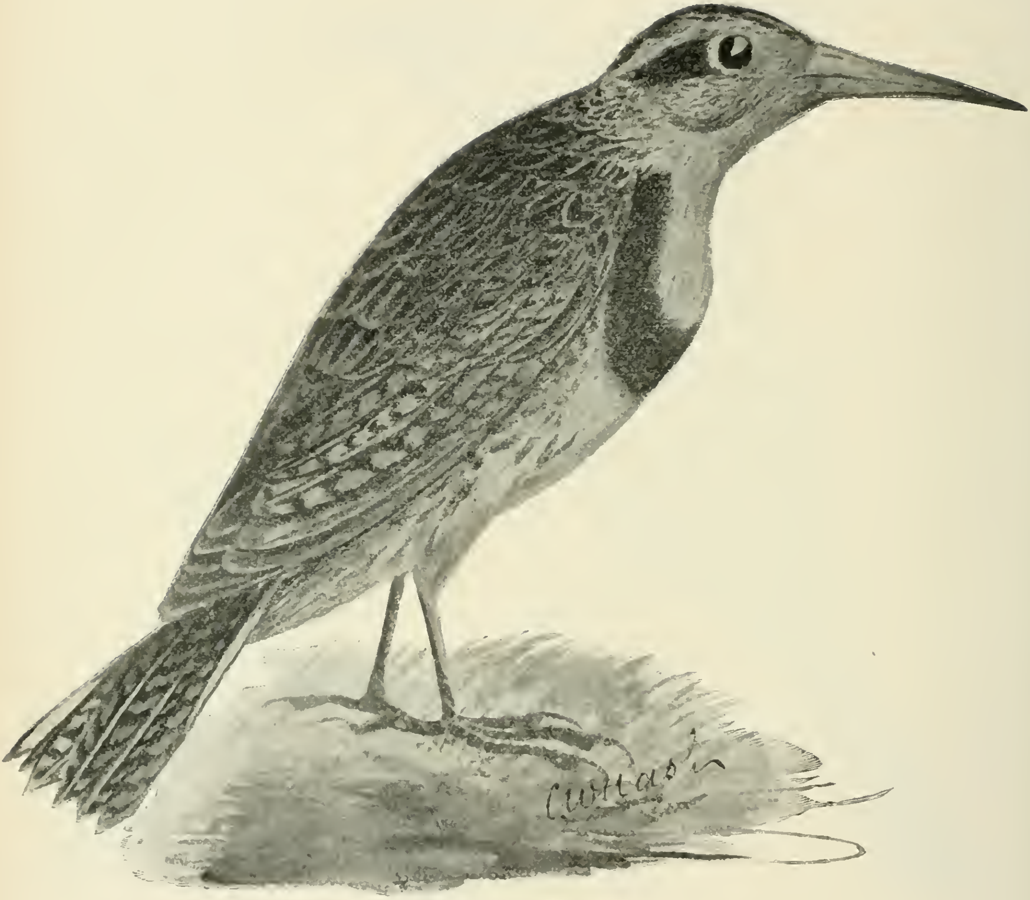
Screech Owl
Megascops asio



Bronze Grackle
Quiscalus quiscula æneas



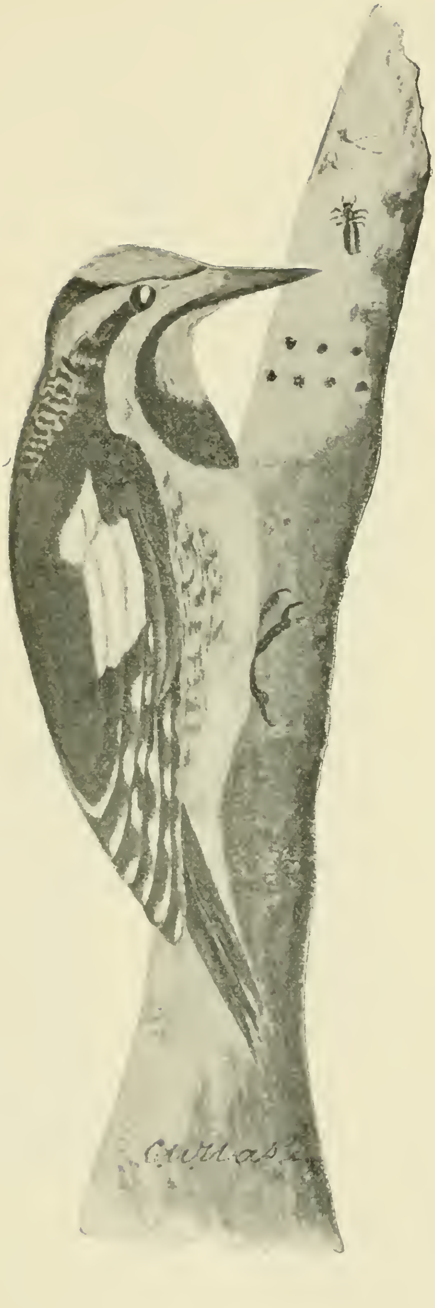
Cow Bird
Molothrus ater



Meadow Lark
Sturnella magna

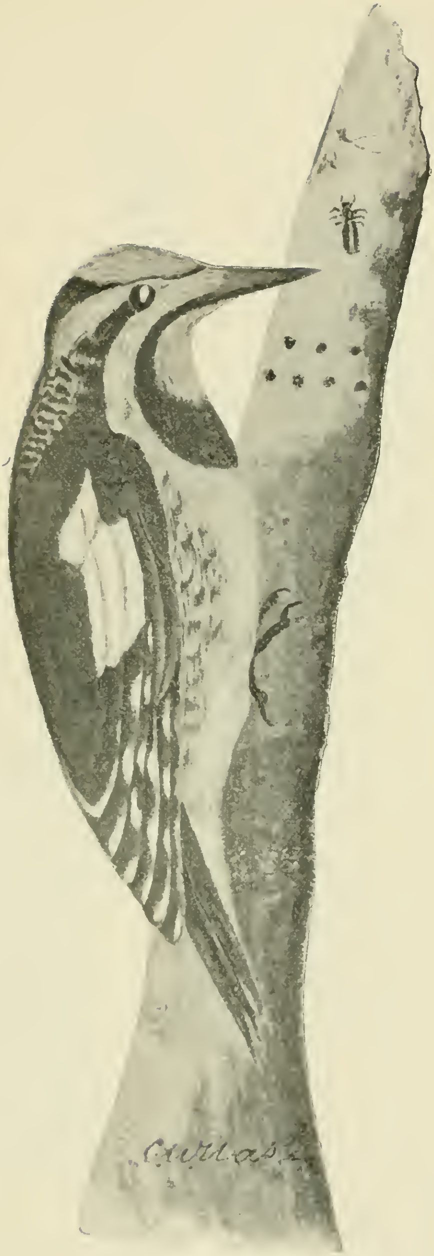
Baltimore Oriole
Icterus galbula

Red-headed Woodpecker
Melanerpes erythrocephalus

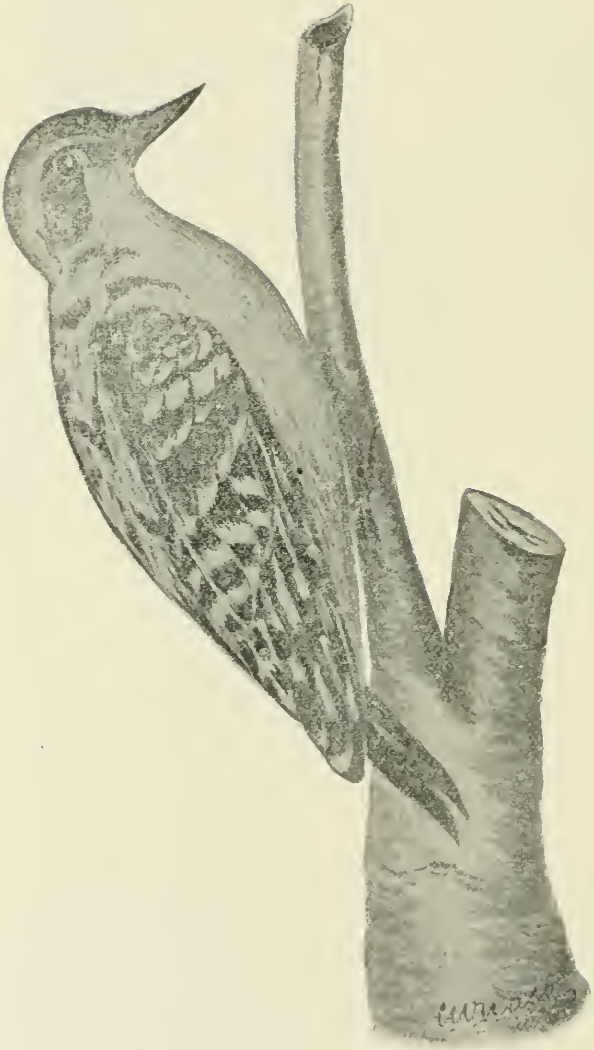


YELLOW-BELLIED WOODPECKER
Sphyrapicus Varius

RED-HEADED WOODPECKER
Melanerpes erythrocephalus

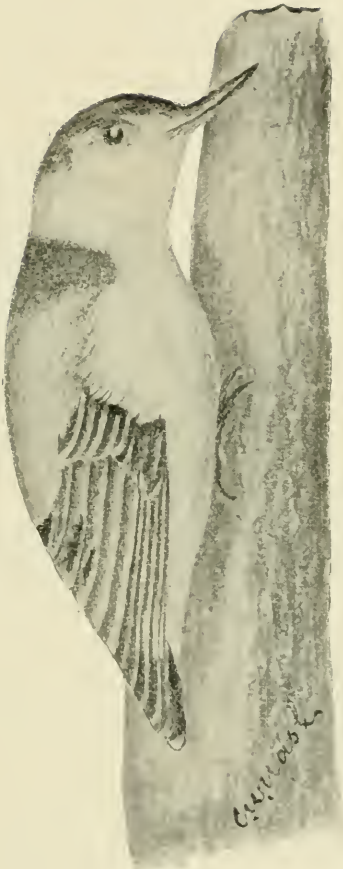


YELLOW-BELLIED WOODPECKER
Sphyrapicus Varius

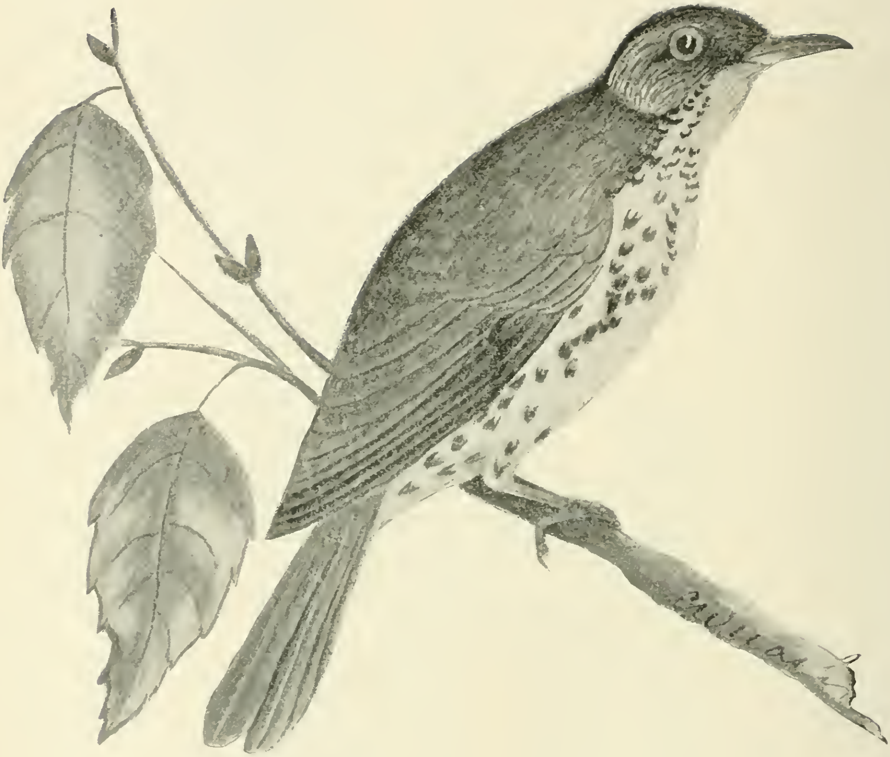


Downy Woodpecker

Dryobates pubescens



WHITE-BELLIED NUTHATCH
Sitta carolinensis



Wood Thrush
Turdus mustelinus

tected places. The destruction of this owl is certainly justifiable and necessary where it has taken up its quarters in a locality in which poultry is kept. It also captures great quantities of our favorite game birds, more particularly Ruffed grouse, many a brood of which goes to satisfy the hunger of the Horned Owl's family, and are so lost to the sportsman. But as against the charge of poultry and game killing which has been proven against it, this owl has some redeeming qualities. It kills great numbers of rats, mice, squirrels and other rodents that are injurious to farmers, and strange to say it seems to be a determined enemy to the skunk. Numbers of cases have been cited in which the flesh and hair of this animal have been found in the stomach of these owls, more particularly in the spring, and I know that fully one-half of the bodies of these birds that I have handled, were well perfumed with the odor of skunk, in many cases so much so, that I have had to throw away fine specimens, the smell being quite unbearable. Possibly these birds are fond of strong odours, for those whose feathers are not scented with skunk perfumery, have generally a strong odour of musk rat, the flesh of which they also appreciate. I have frequently known them to hunt and kill these rats in the spring, during the day time when they were about the banks of the creeks, driven there by the high water of our usual spring freshet. These owls are very powerful birds, usually killing for themselves all the food they eat, and only resorting to carrion in the direst extremity of hunger. Turkeys and guinea fowls, from their habit of roosting in trees, frequently fall victims to the strength and rapacity of these creatures. In such cases only the head and neck of the slain will be eaten, the bodies being left to animals of less power, or meaner ambition, to finish.

The Long-eared Owl is a much smaller bird than the last (being about fifteen inches in length), and contents itself with much humbler fare than its big cousin. It is fairly common throughout the cultivated districts particularly in the autumn, when it may often be found in clumps of willows and alders that have been left in the low places about the fields and pastures. Quite frequently a pair will be found together. These are not, however, always male and female. I have never seen any evidence to show that this owl ever attacks poultry, and I do not believe that it could kill any domestic fowl larger or stronger than a pigeon. Its chief food consists of mice, varied occasionally by small birds and insects, more particularly the wood-boring beetles; ot these one or more will generally be found in the stomach or crop of every specimen examined. It is nocturnal in its habits, rarely moving about during the day unless disturbed, and even then it seems loth to move. Only once have I seen it attempting to hunt in daylight, and that occurred in Western Ontario on a very dull, still day in November, when about four o'clock in the afternoon I saw a pair of them hovering over a field of long grass into which we had driven a bevy of quail. I suspected the owls of quail-hunting on their own account so followed them and shot both, but their stomachs contained no trace of feathers—nothing but mice. The only harm these owls can ever justly be accused of doing is the occasional killing of a small bird, and that is so far overbalanced by the great amount of good they do, that they are entitled to all the protection possible.

The Short-eared Owl is about the same size as the last named species, but may be distinguished from it by the absence of the long ear-tufts, which are a conspiouous feature in the latter. This is probably the most abundant of all our owls, but it seldom frequents cultivated land, usually resorting to low-lying meadows and marsh hay lands. It is most commonly seen in the autumn, and appears to be somewhat gregarious, large numbers sometimes arriving at one of their feeding grounds together, and remaining there for a few days, then all move off again as they came, to be replaced after a short interval by another lot. The great bulk of them leave this Province by midwinter, or before if the snow should become deep, their movement towards the south being regulated entirely by the depth of snowfall. Whilst the ground is uncovered they are able to obtain a full supply of mice, which form the staple article of their diet; when the snow is deep the mice work underneath it. The supply being cut off, they are driven southward, whither the small birds have already gone, so that they cannot fall back upon them. Unfortunately this is a bad failing with the Short-eared owl, in fact my experience shows that it feeds upon mice and small birds indiscriminately, and what is worse, I am satisfied that it kills far more birds than it can eat. Near my home there is a large marsh partially surrounded by low meadows, which support a rank growth of grass, rushes and weeds of various kinds. This place is much frequented in the autumn by sparrows and warblers, migrating southward; in fact at times the place fairly swarms with them. Suddenly a number of Short-eared owls will appear on the scene, and then numbers of small birds will be found lying about dead, some partly eaten and others with only the skull crushed and a few feathers plucked off; at these times I have shot many of the owls, and found the crops and stomachs to contain mice and small birds mixed. This will go on for a few days, or until the owls leave, and each morning the number of dead birds lying about will have increased. After the owls have gone the destruction ceases, only to begin again when the next lot of owls arrive. The small birds thus destroyed are of the greatest value to an agricultural community, and their loss is much to be deplored; but on the other hand the owls destroy an immense number of mice, so that the good they do probably balances the evil, and in such case the best way is to let nature take its course without our intervention.

The Barred Owl is so rare with us that its influence on agriculture, either for good or ill is practically nothing. The few I have found in this Province have always contained mice, but to the south of us where the poultry are allowed to roost in trees it is charged with occasionally killing half grown chickens.

The noisy little Screech Owl, that may in some winters be found in half the barns in the country, is well known to every one, and should be protected by every farmer. It watches the granary, the barnyard and the garden, and is the most indefatigable mouser we have. It seems not only to kill mice for its immediate wants but also for the pleasure of hunting them. If the roosting place of one of these birds is examined after the bird has used it for a short time, numbers of dead mice will be found, most of them untouched after being killed and deposited there; probably they lay up this store in order to provide against nights of scarcity, but in nearly all cases it will be found that they are well ahead of any danger of famine. Not only does this little owl rid the country of numberless mice, but in towns and cities it does useful work in keeping the common House Sparrow within the proper limits. During the winter particularly, it may often be seen hunting about verandahs, under eaves and amongst the Virginia creeper growing around dwelling houses, for the sparrows that roost there, and it will go regularly over the same beat night after night, until the accessible sparrows are thinned down, so that it finds it more profitable to change its hunting ground. Besides its great value as a destroyer of mice and House sparrows, the Screech Owl eats large numbers of the large beetles, particularly the wood-borers and May beetles, both of which classes of insects are capable of doing great injury if suffered to become too numerous. Grasshoppers also form a considerable article of this bird's diet. The good qualities of this little owl cannot be overestimated. Its food consists entirely of such creatures as are most injurious to the crops, and it has not a single evil habit. It should, therefore, be carefully protected and encouraged to take up its abode in and about the farm buildings. This I believe it would readily do if it was left unmolested. All it asks in return for its valuable services, is peace and quiet, and a dark corner to roost in during the day.

The Great Gray Owl, the Snowy Owl, the Hawk Owl, Richardson's Owl and the Saw-whet Owl are only irregular visitors, usually occurring in the winter. The two first named are large birds whose food consists chiefly of game birds when in their own northern home; here they feed upon the small rodents.

The island and sandbar to the south of Toronto is usually visited by a few Snowy Owls every winter. Here the birds feed upon the common house rats which are altogether too abundant at this spot. As every owl of any kind that visits the place is at once shot the rats, having it all their own way, are increasing rapidly.

The Hawk Owl hunts by day on the prairies of the Northwest, and where it occurs in sufficient numbers it must do much good by the destruction of meadow mice. Its visits to us are so rare, however, that it need not be considered here.

Richardson's Owl and the Saw-whet Owl are two little owls that destroy many mice and noxious insects, but are too rare to need farther mention.

Of the ten species of owls before mentioned, nine of them are among the best of the farmer's friends, watching and working when he is sleeping. In following out the natural law which governs their lives they greatly help to keep in check that vast army of little animals which, if allowed to increase unrestrained by their natural enemies, would in a few seasons destroy all vegetation on the face of the earth. The chief and most effective check upon the undue increase of this army of rats, mice, etc., are the birds of prey. These birds are endowed with natural faculties specially adapted for the work they do, and they do it well, the only trouble is that we have too few of them. If, however, public opinion can be brought to bear on this important matter before it is too late, and the wanton and useless destruction of our beneficial hawks and owls stopped at once, the balance of nature may be restored, to the great advantage of mankind.

The following shows the result of Dr. Fisher's investigation of the food habits of the owls as reported to the Department of Agriculture at Washington.

Great Horned Owl. 127 stomachs examined :

31 contained poultry or game birds ; 8, other birds ; 13, mice ; 65, other mammals ; 1, insects, etc. ; 1, fish, and 17 were empty.

This shows that although the bird does some injury by its raids upon game and poultry, yet its evil propensities are somewhat counterbalanced by its destruction of mice, rats, rabbits and other small mammals. It is the only one of the owls about whose record for good there can be any doubt. All the others should be protected, while this one should certainly be killed off, if it takes to visiting the barnyard.

Long-eared Owl. 107 stomachs examined :

1 contained a game bird ; 15, other birds ; 84 contained mice ; 5, other mammals ; 1, insects, and 15 were empty.

Short-eared Owl. 101 stomachs examined :

11 contained small birds ; 77 contained mice ; 7, other mammals ; 7, insects, and 14 were empty. My own experience shows a larger proportion of small birds than the above.

Barred Owl. 109 stomachs examined :

5 contained poultry or game birds ; 13, other birds ; 46, mice ; 18, other mammals ; 16, frogs, lizards, etc. ; 16, insects, etc., and 20 were empty.

Screech Owl. 254 stomachs examined :

1 contained the remains of a pigeon ; 38, other birds ; 91, mice ; 11, other small mammals ; 25, frogs, lizards, etc. ; 107, insects, etc., and 43 were empty.

The above examinations of the stomachs of our resident species show most positively that, with the exception of the Great-horned Owl, the whole family are of the greatest value to the farmer. My own experience, both in Manitoba and Ontario, corroborates this, and is perhaps a little more favorable to the owls, for (always excepting the Great-horned Owl) I have never found a trace of a game bird or domestic fowl in any of them.

Crows, Blackbirds, Orioles, etc.

In this chapter I will deal with two families of birds, both of which are charged with being amongst the worst of the feathered enemies of the farmer. The mischief they do is plainly visible; the good not always seen. When the crow visits the corn field in the spring, and is seen digging into the hills, abstracting the half-sprouted grain, and when the blackbirds in clouds alight on the ripe wheat and oats, eating much and threshing out more, so that it is lost to its lawful owner, it is not to be wondered at that the farmer loses his temper and says in his wrath that all birds are a nuisance ; but these birds also do some good, though, as they have not acquired the knack of advertising it, their benefits are quite overlooked. If their case is tried impartially it may be found that even the Crow like another celebrated personage, is not quite "so black as he is painted." I do not think the merits of the crow or any of the so-called blackbird family will be found sufficiently great to entitle them to protection, but their faults scarcely warrant their extermination, except in the case of the cow-bird, to be spoken hereafter.

Crow. Twenty-five years ago the crows of the Province of Ontario were as regularly migratory as the robins. A few occasionally stayed through the winter with us, and their doing so was considered a sign that we would have a mild season. As the land has been brought under cultivation, and more particularly in neighborhoods where market-gardening is carried on extensively, the number remaining through the winter has steadily increased, so that the species may now be considered a resident one. In the vicinity of Toronto vast flocks gather at the close of the autumn, feeding on the refuse vegetables left in the market gardens outside the city, and resorting at night to some of the pine woods still left standing. In these they roost all through the winter. They may sometimes be pinched by hunger, but, unless the snow becomes too deep, they can generally get at the piles of manure drawn out on the market gardens, and other refuse left about the land. At this time they do no harm, and probably a little good, as they pick up many mice and insects in their foraging, but when spring opens they again scatter over the country and seek their nesting places. Seeding operations are now going on, and the first of the crow's mischievous propensities asserts itself as soon as the grain has absorbed sufficient moisture from the ground to become soft and has slightly sprouted; then it becomes a favorite morsel for the crows. Corn is preferred to any other grain. I have rarely found any quantity of any other grain in the stomach of a crow, and even when the birds have been seen feeding among the hills of sprouting corn and have been shot right on the spot, I have always found the stomach contained quite as large an amount of insect remains as of corn, the cut-worm forming one of the crow's choicest articles of diet, and the question arises as to whether it is not better to let the crow have a little corn and get rid of the cut-worm, than to let the cut-worm take off a lot of corn if we get rid of the crow. Later on I will say something about the history of this same cut-worm. It is always wisest "of two evils to choose the least," and it must be conceded that the corn eating propensity of the crow is an evil; but it is certainly less than the evil done by the cut-worm. So perhaps so far as the crow's case goes here it would be as well to call the balance even and give the crow the benefit of it,

The next scene in the crow's proceedings shows him with a lively and decidedly hungry family of four or five little ones, whose cravings demand constant attention from their parents; the variety of food supplied to these insatiable youngsters will vary somewhat according to the locality in which they are placed; in any case, no more grain will be taken by the parent birds; their food now will consist entirely of insects, mice and the young of other birds. Nor will they stop at the young if they can catch an adult small bird. Sometimes they will try to elude the vigilance of an old hen and will snatch up her chickens more adroitly than any hawk; ducklings fall easy victims to their cunning. It is at this season they do the greatest amount of mischief, by destroying the nests of young and more valuable birds, particularly of such as nest upon the ground. For this reason chiefly crows should be kept within proper limits as to numbers. Of late years they have increased altogether too fast, and our small birds have suffered in consequence.

After the young birds leave the nest they move about with their parents and feed on a most varied diet. They will make a raid on the fruit grower, and demolish his cherries or raspberries if the idea strikes them, or they will prowl along the lake shore and enjoy themselves for a few days on fish fare, after which they will visit a pasture field and clear out all the wire worms, grubs and mice they may find there; in fact, very few things come amiss to them, as they roam about through the country until the cold nights warn them to get together in some place where they can get at least a bare subsistence to carry them over the winter.

As I have said before, crows have increased too fast of late years, and we have now too many of them in the country; their numbers can easily be reduced if a little attention be paid to the matter in the spring. Just at nesting time they are less shy and wary than at any other season and can be approached in the trees within shooting distance. If one of each pair was shot off their numbers would soon be reduced to such an extent that the damage they could do would not be noticeable. These birds are so well able to take care of themselves that even more stringent measures might be adopted against them without any danger of extermination, their natural enemies being very few, and those, of that class against which man has carried on a most successful war. Of these the Great-horned Owl was the most noteworthy, but the Great horned Owl will kill the poultry of a farmer who allows his fowls to roost out on winter nights, and so the owl must go and the crow has one enemy the less.

Raven. This species only occurs in the more northerly portions of the Province, having retired before the encroachments of civilization. To the pioneer it is sometimes a nuisance, poultry and young lambs falling easy victims to this bird's strength and rapacity. They also destroy a large quantity of game, but fortunately their number is so small, and the birds themselves so conspicuous, that it is not difficult to get rid of them.

Blue Jay. It is a pity that so beautiful and interesting a bird as this should be possessed of such mischievous propensities as it is, but I am afraid that neither its good looks nor its good acts can be said to balance its evil deeds. This bird, like the common crow, seems to forget its usual shyness when spring arrives and will leave its wooded haunts and build its nest in gardens, orchards and shrubberies close to houses and quite within reach of every person passing, nor does it affect any sort of concealment as a rule. I have seen many nests so placed that they were visible from public roads where people and vehicles were continually passing. The female could quite readily be seen sitting, yet the birds carried on their duties regardless of prying eyes. It seems a pity that their confidence should be abused, but I am compelled to say that in all cases that came under my observation the Blue Jays badly repaid the persons in whose gardens they were protected and allowed to raise their young. In the first place they steal a large amount of small fruit, and, further they rob and destroy the nests and young of other birds to such an extent that they are positively injurious to agriculture, the birds they destroy being all of that class whose food consists principally of insects, and without whose assistance I doubt if we could succeed in raising any crop to maturity.

The Blue Jays themselves, however, destroy no inconsiderable number of insects, and they do no damage to grain ; they may occasionally pick off a little corn from the cob, but that is about the extent of the injury they do in that direction. Their unfortunate fondness for the young of other birds more valuable than themselves makes it necessary that they should be destroyed when they take up their residence about our gardens, for it is there, and in our cultivated fields, that our insectivorous birds do the most good, and to get them there we must give them as much protection as possible from their natural enemies, and teach them that they are in greater safety near our dwellings than they would be in the woods. Birds of all kinds soon lose their fear of man if unmolested by him, and particularly if they find that in his immediate neighborhood they can raise their young safely. I know of several farms and large gardens where birds have been encouraged and protected from their enemies ; to these places they return in increased numbers year after year, until nearly all available breeding places are taken up. On these premises the owners rarely suffer from the depredations of cut worm or other insects, and so find themselves well repaid for the little care they require to exercise on behalf of their feathered friends.

Bronze Grackle, better known throughout the country as the "crow blackbird," is, when in full plumage, a very handsome bird, and may be distinguished from the other so-called blackbirds by its large size and the brilliant metallic lustre of its feathers. Like the Rook of Europe, it breeds in colonies, and is gregarious at all times of the year. To the farmer, the fruit grower and the lover of birds generally, this bird is a nuisance; all that can be said in its favor is, that it is very beautiful and that it does, at times, eat a large number of cut worms, for which it may often be seen working industriously on the lawns and grass fields near its nesting place, but as against that it has a heavy record of crimes to answer for. They are early migrants, arriving here about the end of March and resorting at once to their nesting places. From this time until the oats are sown they probably feed entirely on insects, but as soon as the grain is in the ground they visit the newly sown fields and help themselves liberally, varying their diet by taking as many small birds' eggs and young as they can conveniently get at. I have on several occasions seen them attack and carry off young robins, in spite of the vigorous defence set up by the victim's parents and all the friends they could summon to their assistance. The row made by the despoiled nest owners on these occasions, together with the frantic dashes they made at the robber, would be sufficient to shake the nerves of one of the hawk family, but the crow blackbird disregards it all, and goes off with its prey.

As soon as the strawberries, cherries, etc., are ripe these birds display a fondness for fruit, and a persistency in gratifying it, that is maddening to the fruit grower, whose profits dwindle day by day by reason of the visits of these thieves, who will continue to carry it off until the young leave the nest. When the young Grackles can fly they gather in large flocks and roam about the country all day, roosting together in vast numbers in some marsh every night. The Dundas marsh, near Hamilton, used to be much favored by them for this purpose; it is at this season they do the worst of their mischief to the fields of wheat and oats. Not only do they eat an immense quantity, but as they flutter and struggle in their efforts to balance themselves upon the straw of the standing grain, they thresh out and cause the loss of much more. Nor does the cutting and shocking stop their ravages; they still continue to feed upon it, until the last sheaf is in the barn. In the Province of Manitoba where these birds are abundant, I have seen all the grain threshed out from the ears for a space of ten yards in width, round fields which had been selected by them for their feeding ground. In this Province they are rarely to be found in sufficient numbers to do as much damage as that, nor are they likely to become so, for although their chief natural enemies, the hawks and owls, have been too much reduced to be able to keep them entirely in check, yet their number is still manageable and may be kept so by the judicious use of the gun. I advise anyone who shoots them, particularly in the early autumn, to try blackbird pie. Whoever does so will, I think, want to repeat the experiment.

Rusty Grackle. This is a much smaller species than the last and is not of any importance to us from an agricultural point of view. I merely mention it as it occurs here in considerable numbers for a short time in the autumn, but as it does not arrive until the early part of September, the crops are safe from its ravages. In Manitoba, where it is very abundant, it unites with the other blackbirds and destroys a large amount of grain. A few pass through this Province in the spring on their way to the north to breed, but they make no delay and are not noticeable.

Red Winged Blackbird. From an agricultural standpoint this bird has little to recommend it, but to the lover of nature its beautiful coloring and cheery note in early spring render it an object of interest. They are among our earliest migrants, arriving about the middle of March, and resorting at once to the marshes, in which they remain until after the young are able to fly. While in the swamps their food consists almostly entirely of aquatic insects, of which the larvæ of the dragon flies form the principal part. As these larvæ form an important item in the food of some of our most valuable fish, and the mature dragon flies feed largely on mosquitos and other small winged insects, the blackbirds are not doing mankind a particularly friendly service by destroying them. This would perhaps not be worth sufficient consideration to warrant our interference with the birds, were it not for their other and more serious failing. As soon as the young are able to fly strongly, which is about the middle of July, they leave the marshes in which they were bred, and in great flocks resort to the grain fields, where, like the grackle, with which they frequently associate, they do much damage, particularly to oats, which they seem to prefer to any other grain. As these birds are very abundant, the loss caused by their plundering must be very great, but they can fortunately easily be managed if a little attention is paid to them in the spring, when they may be shot off on their breeding grounds.

After the grain is carried, they again return to the marshes and gorge themselves on the wild rice, until not a grain of it is left, thereby depriving the wild ducks, etc., of a most attractive food. As soon as the first frost comes they retire to the south, where they cause much worry to the rice-grower. Little can be said in extenuation of these serious faults. They never interfere with other birds or their nests, and they probably destroy some noxious insects, such as cut worms, etc., in meadows, lying near the swamps they frequent in the early part of the season, but this is all that can be urged in their favor.

Cow Bird. Male in summer, all over, except the head, a lustrous, glossy black; the head glossy chestnut. Female and young—dull, sooty black. Length of male, about seven inches, female rather smaller. This bird should be known to everyone and should be destroyed whenever the opportunity occurs. It is the only feathered creature against which I would advocate a war of extermination, and this I do, because it is not only of no value in itself, but the rearing of each one of its young means a loss to the country of an entire brood of one of our valuable insectivorous birds. It is true that during the early part of the season it frequents the pasture fields where cattle are grazing, and feeds principally on the insects affecting such places, but this is easily counterbalanced by the grain it destroys later on. These birds do not mate, nor do they build a nest for themselves, but the female deposits each of her eggs in the nest of some other small bird. The egg is whitish, thickly covered with greyish brown dots. I have found the eggs of this bird in the nests of nearly all the sparrows, finches, and warblers that breed in the Province. After the egg of the cow bird is deposited, the female takes no further interest in the matter, but leaves it to be hatched by the real owner of the nest in which it has been placed; in due time the young will appear and then the trouble arises. In a few days the young cow bird has far outgrown its fellow nestlings, in size, strength and voracity, so that it requires and manages to get all the food the parent birds bring to the nest, the result being that the proper occupants of the nest are either starved to death or crowded out by the interloper, who from that time until it is full grown taxes to the utmost all the energies of its foster parents to supply its voracious appetite. Nothing can be more pitiable than the plight of a pair of small birds upon whom one of these parasites has been foisted. They are forced to raise an ugly foundling instead of their own young, and then by reason of the long continued helplessness of their foster child, they are prevented from raising a second brood, for although it quickly grows large and strong enough to crowd out its fellow nestlings and its body developes rapidly, so that it can leave the nest and follow its foster parents through the trees, yet its energy does not develop proportionately with its body, and it requires to be fed for a longer period than the young of any other small bird. The destruction of the natural enemies of this bird, and the constantly enlarging area of cultivated land, both operate favorably for the increase of this pest, so that of late years it has become altogether too abundant. Last year (1897) in the southern part of Ontario it swarmed everywhere, and I noticed an egg of this bird's in quite half the nests of other small species that I chanced to find; of course, in every case I took it out and promptly smashed it, thereby saving the proper brood. It is to the increase of these creatures that I attribute almost wholly the decrease which has become so noticeable in our more useful species. Some idea may be obtained of the terrible destruction worked among the valuable species by cow birds by just noticing the immense flocks of them that occur here in the autumn, and remembering that for every one of those cow birds, a brood of some other species has perished. Most of our insectivorous birds produce an average of about four young to a brood, and some of them would raise two broods in a season; the deposit of an egg by the cow bird in a nest prevents the raising of any young at all of its own by the bird victimized. Just how many eggs each cow bird lays each season is rather uncertain; in all probability four or five are deposited. If that is so, every female cow bird that arrives here in the spring and is allowed to follow her own method of reproduction, causes the loss of from fifteen to twenty-five of the young of our most valuable birds. In view of the great increase that has taken place in the numbers of this bird of late years, it is not to be wondered at that our other native species are decreasing, and we should take steps at once to regulate matters. Every person on finding a nest of any of our small birds should look over the eggs contained in it, and if one is found therein differing from the others and corresponding to the description of the egg of the cow bird which I have already given, that egg should be taken out and destroyed. School teachers throughout the country would do well to impress this upon their pupils.

Shooting the females in early spring is perhaps the most satisfactory way of keeping down the number of this most undesirable bird, and I strongly urge every one who has access to a gun to use it for this purpose, about his own premises; for as I have already pointed out, every one killed at this season means the salvation of much valuable bird life and a corresponding lessening of our insect pests.

Bobolink. One of the most familiar sounds of summer in the country is the merry rollicking song of the Bobolink, to be heard at all times in the fields of scent-laden clover; its bubbling notes, poured out in the exuberance of its spirits, seem to express the feeling of joy that pervades all nature in June. The birds arrive here about the middle of May, the males coming a few days before the females. They resort at once to the hay meadows, and remain there through the nesting season, which is concluded by the time the hay is ready to cut. Whilst on the farms their food consists entirely of insects, of which the caterpillars that feed on clover form the greater part. These caterpillars are very abundant and where they are not kept in check by the birds sometimes do serious injury, so that apart from its appearance and its good qualities as a musician, the Bobolink has a claim upon us which entitles it to our best care and protection. After the hay is cut the males lose their black and white plumage and become like the females and young in appearance, of a yellowish brown color. They then associate in small flocks and frequent the marshes, feeding on wild rice and the seeds of some rush-like plants until the first frosts come, when they retire to the south for the winter.

In the rice-growing States these birds are sometimes accused of doing considerable mischief to the planters' crops, but I am inclined to think that the various species of blackbirds, which also resort to these States, are the principal depredators, and by reason of their greater abundance do the most of the damage.

Meadowlark. The Meadowlark is a common though, unfortunately, not now an abundant bird on the farm. Some years ago it could be found wherever the land was cultivated, all through the Province, but owing to its size and slow straight flight, which makes it an easy mark for the gunner, its numbers are decreasing very fast. This is a great pity, for it is an exceedingly valuable bird to the farmer. From the time of its arrival here in March until its departure in November it resorts to the cultivated land and grass meadows, feeding entirely on insects, and never indulging in grain or fruit of any kind All its work being done amongst the crops upon which man expends his labor and to which he is compelled to look for his subsistence, the benefit conferred is direct and should be appreciated. We cannot make any return for the good it does, but we can at least refrain from destroying its life, and exert ourselves a little to prevent others from doing so.

The class of insects upon which this bird feeds during the early part of the season is perhaps the most injurious to vegetable life of all our insect enemies. Its food consists chiefly of those known as cut worms, wire worms, etc., all of which work underground for the most part during the day and only emerge from their hiding places at night. By some highly developed faculty the meadow lark is enabled to locate these creatures in their hiding places, and being provided with a sharp beak of sufficient length for the purpose, is able to drag them out and devour them. Of all the stomachs I have examined prior to July, the principal contents were wire worms, cut worms, and some few other caterpillars and beetles; later in the season the food consisted principally of grasshoppers. On two or three occasions I have found a few of these birds wintering with us, in the vicinity of market gardens, and being curious to know if at that season they had been compelled to fall back on a seed or vegetable diet, I shot one out of each lot, and I found the birds were in remarkably good condition. Their stomachs contained, however, nothing but insects, chiefly bugs and beetles, which they had probably obtained from manure heaps and the refuse cabbages left in the gardens. These birds build a domed nest on the ground, in grass fields; their eggs and young are therefore liable to be destroyed by crows, skunks and other vermin, and those that escape their natural enemies are subject to such continued persecution from gunners who ought to know better, that our beautiful and useful Meadowlark is in danger of extermination, unless some effort is made for its protection.

Baltimore Oriole. The Golden Robin, fire bird or hang-nest, as this bird is sometimes called, is of more importance to the fruit grower than the grain farmer, as it gleans its food entirely among the branches, only visiting the ground for material with which to construct its purse-like nest. Its food consists largely of leaf-eating caterpillars and beetles. It is also particularly fond of the moths which frequent the trees for the purpose of laying their eggs; of these moths it devours large numbers, and in this way it materially assists in keeping down the army of leaf eaters which so frequently strip our trees of their foliage. Very few of our birds will eat a hairy caterpillar, but when they eat a female moth before she has laid her eggs they destroy at one stroke a whole brood of these pernicious creatures, and to this work the Oriole devotes itself with great industry.

I have on several occasions obtained a brood of young Orioles and hung them out in a cage near my house for the purpose of discovering the nature of the food brought to them, and found that fully one-half consisted of moths; unfortunately I did not keep a record of the number of these brought in any one day, but it was very large, and the usefulness of this bird in keeping down the swarms of destructive caterpillars, by cutting off the source of supply, was clearly exemplified. When the cherries ripen the Oriole displays a certain partiality for fruit, but the small quantity they take may well be spared them, more particularly as it is only in this direction that they levy any toll for their services. The brilliant coloring of the male, his flute-like note, and the ingenuity displayed in the construction of their nest, all commend these birds to the lover of nature, and we could well spare a few cherries for the sake of having them about our gardens, even if their usefulness was less pronounced than it is. In the south-western portions of our Province the Orchard Oriole occurs. It differs from the Baltimore in being smaller and in color being chestnut and black, instead of the orange and black which marks the present species. Its habits are much the same as those of the familiar Baltimore, but it is too rare to have any economic value.

WOODPECKERS, NUTHATCHES, TITMICE, ETC.

The various species which constitute these families have been grouped together, because of certain similarities in their habits, although structurally they differ widely. They are all tree climbers, and obtain the greatest part of their food from the trunks of trees, some of them by laboriously digging out the grubs which bore into the solid wood, others by prying into every crack and crevice of the bark, where they find insects in various stages of development.

Of the Woodpeckers we have in Ontario nine species, namely, the Pileated Woodpecker (better known as the "Cock of the Woods"), the Arctic three-toed Woodpecker, the American three-toed Woodpecker, Hairy Woodpecker, Downy Woodpecker, Yellow-bellied Woodpecker, Golden-winged Woodpecker, Red-headed Woodpecker, and Red-bellied Woodpecker. The first three are true birds of the forest, very seldom showing themselves in the neighborhood of cultivation, so that, although their service are of great value to the country, by reason of the constant war they carry on against the borers, which are so injurious to our timber, we need not consider them in this paper. The Hairy Woodpecker and the Downy Woodpecker are two species that almost exactly resemble each other both in habits and appearance, the only material difference being in their size, the Hairy Woodpecker measuring about nine inches in length, the Downy about six inches. Their food, which consists almost entirely of insects, is obtained either by digging the grubs out of the wood, or picking them out of the crevices of the bark in which they hide during the day. Sometimes during the winter I have found the stomachs of these birds filled with the seeds of the hemlock. These seeds seem to form a favorite food with many of our birds at this season; the berries of the sumach are also occasionally eaten by the little Downy, perhaps for the sake of the small beetles that are always to be found amongst them. These are the only two vegetable substances that I have ever known either of these species to feed upon.

Both these Woodpeckers are accused of injuring trees by boring holes in them to obtain a flow of sap, which they are said to drink. This is a mistake. The bird having the sap-sucking habit is the Yellow-bellied Woodpecker, an entirely different species, of which I shall speak presently. Nature has most perfectly fitted these birds for their task of ridding the trees of the grubs which bore into them. Their beaks are hard, sharp and chisel-like, so that they are enabled to enlarge the holes inhabited by these insects sufficiently to enable them to insert their long, barbed tongue, with which they extract the larvæ from their hiding places. In the winter these birds frequently visit the orchard, garden and shrubbery, and there they do most valuable work, by destroying the chrysalids of the moths that produce the leaf-eating caterpillars. The toughest cocoon ever spun by a caterpillar is no protection against the sharp beaks of these birds, even the strong case which encloses the chrysalis of the large cecropia moth is soon torn open when found by a Downy Woodpecker and the contents devoured. Ants and borers in the trees are also greedily eaten by both species; in fact, nothing in the shape of insect life comes amiss to them, that can be found within their reach. The valuable work done by these birds for the protection of our trees should commend them to every lumberman, fruit grower and nurseryman, and though we cannot do very much to protect them from their natural enemies, we can cease destroying them ourselves and discountenance it in others.

Red Headed Woodpecker. This is the most beautiful bird of the whole Woodpecker family, the strong contrast of the glossy black and the white of its body and the brilliant crimson of the head of the adult birds render them very conspicuous objects of the country; their value from an economic point of view, however, is debatable. From the time of their arrival here in April until the first strawberry ripens these birds feed on insects entirely, and in pursuit of their food they often adopt the tactics of the flycatchers by mounting to the top of a telegraph pole or bare limb of a tree, and from thence darting out at any passing insect large enough to attract their attention. If the location selected is a favorable one and food abundant, they will remain at the same spot for some time; but after the small fruits ripen their tastes change and they then visit the strawberry patches, both wild and cultivated, and cherries and raspberries are also eaten by them, and carried to their young. When the season for small fruit is over they again resort to their insect-eating habit, and, so far as I have been able to observe, are not in this Province ever addicted to pilfering grain. I have occasionally seen an odd one make a raid on a vineyard and take a few grapes, and once or twice have seen them pick holes in apples, but the habit does not seem general.

There is no doubt that in the spring they do much good by destroying numbers of mature insects which, if allowed, would deposit eggs to produce vast numbers of injurious caterpillars. It is true also that in districts where small fruit is cultivated for profit they do much harm if they become sufficiently numerous. As the case now stands they are too scarce to do much injury and, except when they are too persistent in their visits to a garden or orchard, they may well be left alone.

Although these birds are regular migrants, arriving here about the middle of May and leaving in September, I have once or twice met with them in sheltered woods in South-western Ontario in the winter, where the bright plumage showed to great advantage against the evergreens.

The habits of the Red-bellied Woodpecker are very similar to those of the above species and its economic value about the same, but as it only occurs in the south western counties of the Province and then in very small numbers, it need not be further considered.

Golden Winged Woodpecker. Flicker, High Holder, Yellow Hammer, Pigeon Woodpecker, and half a dozen other aliases, testify that this is a well known if not always a popular character. Like the last species, the value of this bird from the fruit-growers standpoint is debatable, but it is not quite so much given to fruit eating as the Red Head, though when it has seven or eight hungry young ones to feed and it finds a cherry orchard handy, it will help itself to a good many cherries, for which it has a decided predilection. Apart from this unlucky habit the bird has many good qualities In some of its ways, it much resembles the Meadow Larks ; like them it may often be seen stalking about on the ground searching for ants, of which it destroys vast quantities. I have often found their stomachs filled with them, and have rarely examined one without finding it contained some of these insects; it also devours great numbers of grasshoppers, beetles, moths and other ground insects. This bird is really a ground feeder, for, though classed amongt the Woodpeckers by reason of certain similarities of structure, it does less woodpecking than any other of its class, the beak not being as well fitted for that operation as the beaks of the others. It has also the peculiarity of being able to perch crosswise on a branch, a method rarely adopted by its relations. There is one other evil trait I have seen this bird exhibit, on two occasions only, that is the destruction by it, of nests of the Bluebird, both the nests destroyed were built by the blue birds in holes in trees much higher than usual, probably from forty to fifty feet from the ground. I am not certain what the nests contained at the time, but I saw the woodpeckers pull out the nests and throw them piecemeal to the ground in spite of the resistance of the Bluebirds, but I found no trace of eggs or young; if there were any, they must have been eaten. It is probable that the woodpeckers wanted the nesting site for themselves and so dispossessed the owners. If so they were disappointed, for I settled that question by killing them, but am sorry to say I omitted to examine the stomachs to see whether or not they had devoured the young Bluebirds, if there were any. I am inclined to think these were exceptional cases ; they occurred over twenty years ago and I have never seen a repetition of the trick. If these birds become a nuisance in a garden or orchard they can easily be killed off while they are committing their offence, but I think that through the country generally, the good they do far overbalances the little damage they may do locally.

Yellow-bellied Woodpecker or Sapsucker. Adult male, crown and chin crimson, back and wing coverts black and white, wings black with a large white bar, tail black, inner web of the two central feathers white with black spots, breast black edged with yellowish, the rest of the under parts dull yellowish, the sides white with black streaks. In the female the crimson of the crown and chin is wanting, the crown is black with sometimes a few traces of crimson on the forehead, the chin is white. I give a description of this species in order that it may be distinguished from the other small Woodpeckers, because it is principally owing to the propensity for drinking sap which the bird has that a certain prejudice exists in some localities against all the Woodpeckers, or sap suckers as they are called. It is quite true that these Woodpeckers do, in the spring, when the sap is rising, bore small holes in the bark of various trees for the purpose of obtaining the sap as it flows from them and also to attract the insects upon which they feed to the same spot so that they can satisfy their hunger and thirst without having to over-exert themselves in so doing. If life was not so short, I might be tempted here to go into the question as to whether this bird had to acquire this habit because its tongue was peculiarly fitted for it, or whether the tongue became modified so as to just suit the habit after the bird had acquired it ; for the bird's tongue certainly differs from that of other Canadian Woodpeckers and is admirably fitted for the use to which it is put. A discussion of the question would exceed the scope of this article, and probably not lead to anything after all. We know the bird has this habit and the question is, what is the effect of it upon the trees which are bored? I have made what observations I could, and as many enquiries from others as possible, and have come to the conclusion that the only real damage done is that a young tree may be rendered unsightly for a time, or it may even be permanently disfigured by some peculiarity in the healing of the bark, but usually no harm ensues. That a tree ever was or could be killed by it I do not believe, for I have never yet seen or heard any evidence in proof of it.

Apart from its sap-drinking peculiarity the bird's record is excellent ; it is not a fruit or grain eater, but devotes itself to the destruction of insects that live on the trees or hide in the loose bark. Ants form a large proportion of its food. These it obtains from the rotten wood in which they burrow, as it does not descend to the ground in search of them.

Beetles and moths are also sought out and devoured, but as this bird's tongue is not as well barbed as that of some of the other woodpeckers, fewer grubs of the wood-boring class are eaten by it. I suppose if any man believes that these birds are doing an injury to his trees he should be allowed to protect himself in the only way possible, viz., by getting rid of the birds on his own premises; but for his own sake he should be sure he gets rid of the right one, and that neither the Downy nor the Hairy are destroyed by mistake. Both the Downy and the Hairy Woodpecker remain with us all through the year, whilst the sapsucker is a summer resident only; so that whenever a woodpecker is seen in the winter it should be spared, for it is most certainly a beneficial one.

Nuthatches, Chickadee and Tree Creeper. Of these we have two species of Nuthatches, the White-breasted and Red-breasted, one Chickadee and one Creeper. They are all resident species, though more frequently seen about cultivated lands in the winter than in any other season. They are among the most active insect destroyers we have, gleaning their food from the bark, branches and leaves of trees, and seldom descending to the ground, though when wood-chopping is going on in the bush the logs, sticks and chips will all be carefully searched for grubs which have been exposed by the axe. The familiarity displayed by these little creatures at such times is very pleasing. As soon as work begins and the first few strokes of the axe sound through the bush, they gather round and investigate every piece of bark and decayed wood thrown open, and from each one gather some prizes. It is very amusing to watch the little Chickadee when he finds a large grub of one of the borers partly exposed He pulls and tugs at it until it comes out, and then securely holding it down with his feet he tears it in pieces and devours it. Without the assistance of the chopper it is but seldom that they can get at the larger grubs that bore deeply into the solid wood, as they have neither the strength nor proper tools for digging them out; but they have found out that when the farmer gets out his cordwood their opportunity for a feast arrives, and so they take advantage of it. As a general rule, however, they scour the bush, orchard and shrubbery in merry little parties searching for food, from time to time uttering their musical notes, which always have a peculiar "woodsy" quality about them. The seeds of the hemlock are occasionally eaten by the Chickadee and Red-breasted Nuthatch, and the White-breasted Nuthatch is said to sometimes eat beechnuts and acorns, but I have never found any trace of them.

The Tree Creeper eats no vegetable substance whatever.

This little group of birds is of the greatest value to the fruit-grower, as they feed principally on the minute insects and their eggs, which are individually so small that they escape our observation until, having seen the damage done by them, our attention is called to their existence, and then it is too late to enable us to remedy the matter for the season.

THRUSHES.

We have in Ontario seven species belonging to this family, all of them migratory, arriving here from the south in early spring and leaving us in the autumn, as cold weather sets in. They are the Wood Thrush, Wilson's Thrush, Grey-checked Thrush, Olive-backed Thrush, Hermit Thrush, Robin and Bluebird. The Olive-backed Thrush, Hermit Thrush and Grey-checked Thrush pass on and raise their young to the north of us; the others remain throughout the summer and breed here.

The Wood Thrush and Wilson's Thrush, or Veery, as it is sometimes called, are strictly birds of the woodlands, and seldom venture far from the edge of the bush, though both species will at times select a garden where there are shrubs for their summer residence, if they find themselves unmolested, particularly if there are no domestic cats about the premises. The cats at all times prefer young birds to mice or rats, and are as much to blame for the decrease of our native birds as bird-nesting boys or anything else, perhaps, except the Cow bird. Wilson's Thrush is one of our most abundant species, but it has the faculty of concealing itself to such perfection that it is often overlooked though there may be many within a few yards of where a person is standing. The Wood Thrush is very rare with us, which is to be regretted, as it is a beautiful songster.

All these thrushes are very valuable birds to the agriculturist, their food consisting for the most part of grubs that live under the surface of the ground, and caterpillars. In the autumn they eat many of the wild berries, those of the Elder and Viburnum being especial favorites, but they never help themselves to the produce of the farm or garden. The best known and most familiar of the thrush family is the Robin, and opinion is very strongly divided as to its utility. Many fruit-growers condemn this bird with great emphasis, stating that it is the worst enemy they have; others weigh its merits and demerits more carefully, and are inclined to think that it at least pays for the fruit it eats by the destruction of insects. No doubt it does take a large number of cherries, strawberries and raspberries, and some grapes, but it is open to question if it were not for the birds whether there would be any cherries, strawberries or grapes, or, indeed, whether any crop could be brought to maturity. The great merit of the Robin is that in the early part of the season it feeds itself and its young almost entirely on cut worms and on the large white grub, the larva of the May beetle. Of all our insect enemies the underground cut worm is about the most destructive, for in feeding it just comes above the surface and cuts off the entire plant, or if the plants are very young and the stems small it cuts off half a dozen or more at one time, only eating a small section out of the stem of each and leaving the plant dead on the surface of the ground. Whole rows of peas, corn, beets, cabbage and cauliflower are often so treated; tomatoes, too, fare badly with them. The only remedy that seems effectual against their attacks is to wrap paper around the stems of the plants from the surface of the soil to the height of about three inches above it. This is obviously impossible in the case of field crops, and it is equally impossible to go over the fields and take the worms out by hand, so that we must rely, for the most part, upon the ground feeders amongst the birds; these are fitted by nature for digging out the insects and devouring them.

Robin. Among the most conspicuous of these birds is theRobin, and one need only watch one of them at work in the garden, from April to about the middle of June (which is the season of the cut worm's activity) to be satisfied as to the Robin's good work. I will give the result of an experiment carried on by myself, which will satisfy any one as to the number of these insects a pair of Robins will destroy when they are feeding a brood of young. In May, 1889, I noticed a pair of Robins digging out cut worms in my garden, which was infested with them, and saw they were carrying them to their nest in a tree close by. On the 21st of that month I found one of the young on the ground, it having fallen out of the nest, and in order to see how much insect food it required daily I took it to my house and raised it by hand. Up to the 6th of June it had eaten from fifty to seventy cut worms and earth worms every day. On the 9th of June I weighed the bird; its weight was exactly three ounces, and then I tried how much it would eat, it being now quite able to feed itself. With the assistance of my children I gathered a large number of cut worms and gave them to the Robin after weighing them. In the course of that day it ate just five and one half ounces of cut worms. These grubs averaged thirty to the ounce, so the young Robin ate one hundred and sixty-five cut worms in one day. Had it been at liberty it would probably have eaten some insects of other species and fewer cut worms, but this shows near about what each young Robin requires for its maintenance when growing; the adult birds require much less, of course. The average number of young raised by a robin is four, and there are usually two broods in the season. A very simple calculation will give a good idea of the number of insects destroyed while the young are in the nest. After the young have flown they are apt to visit the small fruit, and it is no doubt very provoking to find a flock of them helping themselves to strawberries, etc. If possible, they should be kept off without destroying them, a resort to the gun being avoided as long as possible.

Bluebird. Twenty years ago the Bluebird was one of the most abundant of the summer residents in the cultivated districts of the Province; there was scarcely a farm throughout southern Ontario upon which two or more pairs of these birds did not breed. The same birds seemed to return regularly to occupy their holes in the old apple trees and fence posts, year after year, and so familiar were they that they actually seemed to know the members of the family whose premises they occupied. In one case, near Niagara, a pair of Bluebirds for several years in succession built their nest in a letter box which was placed at the gate of the farm, opening on the main road. The mail carrier deposited letters and newspapers in this box every day, which were duly taken out by the members of the family. To all this the birds paid no attention whatever, but would confidently sit upon their eggs or visit their young while the box was opened and people stood close to them; and I have seen many similar instances of confidence on the parts of these birds.

Of late years the Bluebirds have not remained with us, and they have been much missed. Enquiries are constantly being made as to where the Bluebirds have gone? That is not so easy to answer, but that they still exist in undiminished numbers I am able to state positively, for so late as last march (1898) I saw many thousands passing over Toronto from west to east. The flight lasted from daylight to nine or ten o'clock every fine morning for about a week. I have seen this same movement every spring for years. My opinion is that the birds have gone back to the new settlements, where they can still find snake fences and pastures in which the old stumps are standing—our modern barbed wire which has taken the place of the old stake and rider fence having deprived them of a favorite nesting place. The up-to-date fruit grower, too, no longer allows his apple trees to go untrimmed and full of holes, but cuts out the old trees and replaces them with young ones. This has removed many of the old nesting sites and the birds have spread out over the large area of new country now being brought under cultivation. They introduced themselves into the Province of Manitoba about 1884, and have since become quite common there, having evidently followed the settlers, as they were quite unknown in that country before it was brought under general cultivation.

The utility of this bird as an insect-destroyer is beyond question. It eats neither grain nor fruit; occasionally in stormy weather in early spring when its insect food is hard to obtain, it will eat the berries of the sumach, but that is the only vegetable substance I have ever known it to take. The beauty of its plumage, its sprightly spring song, and even the rather melancholy farewell notes in which it bade us good-bye, as it drifted southward in the last days of October, made it a great favorite everywhere, and every lover of nature would be glad to see it return and take its old place about the farm once more.

Cat Bird. Neither this nor the succeeding species belong to the Thrush family, but there is a sufficient similarity in their food habits to warrant our considering them here. They are closely allied to the famous Mocking Bird of the south, and their musical powers are not very much inferior to that splendid songster. They do not, however, so frequently exercise their power of mimicry. The peculiar mewing note uttered by the Cat Bird has caused a certain amount of prejudice to exist against it, and has made it subject to persecution at the hands of most boys; but apart from this unpleasant note, the Cat Bird is one of the most accomplished musicians we have, and it is more to be admired because it does not retire into solitude to pour out its joyous songs, but rather seeks the society of mankind, and in the morning and evening will sing its clear notes from the top of some tree in close proximity to the dwelling house. Its food in the early part of the season consists almost entirely of caterpillars and beetles, which it obtains generally from the branches and leaves of trees, though sometimes after rain it seeks for cut worms and other grubs from the ground. Later in the year it feeds largely upon elderberries and other small wild fruits, and does occasionally levy some slight toll from the garden; but for all the cultivated fruit it takes it has amply repaid the gardener by its efforts in the destruction of the insect tribe.

Brown Thrush or Thrasher. All that I have said of the Cat Bird applies to this species, but it is not quite so familiar and confiding in its habits. It displays a decided preference for thick shrubbery at some little distance from the house. Here it remains in seclusion for the greater part of the day, but in the early morning and evening the male mounts to the top of some tall tree near its haunt, and for an hour or so will sing his beautiful song, which is much louder, though less varied, than that of the Cat Bird.

Wren. This is most an interesting and useful family of very small birds. Four species of them are found in this Province in the summer. Two of them, the Long-billed Marsh Wren, and the Short-billed Marsh Wren, as their name implies, frequent our marshes and low swampy meadows, where they assist in keeping down the horde of mosquitos that are bred in such places. The Winter Wren is a more transitory visitor, the great bulk of them only passing through here in the spring and fall migrations. A few, however, remain here through the summer and nest in some secluded ravine in the woods.

The pert little House Wren takes up its abode right in and around the farm buildings, and even in our cities it will find a resting place, if it can get access to sufficient garden room to give it a hunting ground, and as it is quite satisfied to place its nest in a crevice or hole at no great height from the ground, it is not so likely to be dispossessed of its home by the European sparrow as are birds that prefer a higher location. They are most indefatigable insect hunters, and should be encouraged to build in every garden. All that is necessary is to furnish them with a small box having a hole about one and one half inches in diameter. Nail this up to a fence or building, about eight or ten feet from the ground, so that cats cannot get at it; and if any wrens come that way in the spring they are almost sure to take possession of it, and having once occupied it, they will in all probability return every year. The domestic cat is their worst enemy, and they seem to know it, for as soon as they catch sight of one of these detested creatures they start such a scolding that they arouse the whole feathered tribe in their neighborhood. In the autumn they eat a few elderberries, but this is the only vegetable food I have known them to take.

Cuckoos. These birds do not seem to be very well known in our province, though we have two species, one of which is not uncommon. They are known as the Black-billed Cuckoo and Yellow-billed Cuckoo. Both of them are slim birds about twelve inches in length, of an olive brown color above, and white beneath. The Yellow billed may be distinguished from its relative by the light chestnut color of the inner webs of part of the wing feathers. This is quite noticeable when the bird is flying. It also has the under mandible of the beak clear yellow. In the Black-billed species, the beak is all black, sometimes showing slight dull yellow marks below. Although the birds themselves are not known, most residents of the country must have noticed the loud harsh notes of "kow kow" uttered by them, most frequently heard before and during rain, by reason of which the birds are in some localities called "rain crows."

The well known Cuckoo of Europe has the bad habit of laying its eggs in the nests of other birds, but although I have heard our birds charged with the same thing, I have never yet come across an instance of it, but have always found their nesting habits to be quite orthodox, though the nest they build can hardly be considered a model of bird architecture.

These two species of birds are the only ones, that to my knowledge habitually eat hairy caterpillars, and of these noxious insects they must destroy a large quantity, an examination of their stomachs generally showing a considerable number of them. On one occasion I found the stomach of a Black billed Cuckoo packed with the spiny caterpillar of *Vanessa antiopa*, an insect that feeds in colonies and does much damage to the elm and willow trees. The habits of the two Cuckoos are much alike; the only difference I have noticed is that the Yellow-billed species seems to prefer the upper branches of tall trees in which to obtain its food, while the Black-billed resorts more to orchard trees and shrubbery. I have not found any evidence of fruit-eating against either of them, so that from an economic standpoint they must be considered as purely beneficial, even if they do occasionally deposit an egg in the nest of another bird.

Warblers. This family contains a large number of species, among them being some of our brightest colored and most interesting birds, though none of them are remarkable as songsters. They are all entirely insectivorous, and consequently of great value from an economic point of view. Thirty-one species are known to occur in this Province; of these five are so rare as to be considered accidental visitors. They are the Prothonotary, the Golden-winged and Hooded Warblers, the Louisiana Water Thrush, and the Yellow-breasted Chat. Probably when they do occur, they remain and breed here.

The Cape May, Orange-crowned, Tennessee, Cerulean, and Connecticut are regular but uncommon visitors. Of these the Cerulean is known to breed in some localities in southern Ontario, but it is not generally distributed.

The Parula, Black-throated, Blue, Myrtle, Magnolia, Blackburnian, Bay-breasted, Black poll, Palm and Wilson's warblers, all pass on to the north before nesting. Just how far they go is difficult to say, but in all probability the majority of them at any rate will be found breeding in the unsettled districts of Muskoka, Algoma, etc., and some even south of that.

The Black and White, Nashville, Yellow, Chestnut-sided, Pine, Redstart, Black-throated Green, Oven bird, Water Thrush, Mourning, Maryland, and Canadian Warblers, are generally distributed and breed with us in suitable localities and in varying numbers each season, the most familiar of them all being the Yellow Warbler which habitually raises its young in and about our orchards and shrubberies. All through the summer they are actively engaged in exterminating the hosts of our smaller insect enemies, and many thousands of broods of caterpillars are destroyed by them before they have become large enough to do mischief.

Flycatchers. These birds, as their name implies, subsist largely upon winged insects, which they capture by darting upon them from some elevated post overlooking an open space frequented by their prey.

We have eight species of which the Crested Flycatcher, the King Bird, the Phœbe Bird, the Wood Peewee and the Least Flycatcher are summer residents, and the Olive-sided, Yellow-bellied, and Traills Flycatcher are transient visitors, passing through in their spring and fall migrations.

The King Bird is probably the most obtrusive creature of the whole feathered tribe in Canada. As soon as a pair take possession of a tree in an orchard they immediately proclaim the fact to the neighborhood, and then trouble befalls everything wearing feathers that ventures to trespass on what they are pleased to consider their domain. Crows, Hawks, Jays, and Blackbirds are their especial detestation, and should one of these birds appear near their tree an attack by the King Birds immediately follows, the assault being kept up until the intruder is ignominously driven off, having lost a few feathers in the encounter, the loss serving to remind him that other people have rights which he is bound to respect. The King Bird captures a vast number of mature insects, both in the air and on the ground, and as at least half these insects would produce eggs to become caterpillars the service rendered is very great. In the early spring, when driven by hunger, the King Bird will eat the berries of the sumach, but as the clusters of these berries form a favorite hibernating place for many beetles, it is quite possible that the insects form the attraction and not the fruit. This is the only vegetable substance I have ever known the bird to touch. I have heard complaints from bee-keepers that these birds will destroy bees. It is just possible that they will occassionally take them, but I have seen no evidence that they have acquired the habit. In case the King Birds should be seen frequenting the vicinity of hives, it would be well to watch closely before shooting the birds, as they are too valuable to be wantonly destroyed, and in all cases an examination of the stomach contents should be made, and the information gained should be reported.

There is scarcely a farm in the country that has not one or more pairs of Phœbe Birds nesting in or about the buildings, and I fancy there are not many bridges of any size under which a nest may not be found; and so I hope it may continue, for the Phœbe is a most useful and friendly little bird. It has all the good traits of the family without being too aggressive, and no suspicion of any act which is in the least injurious attaches to it. If the birds and their nests are left unmolested, they will return year after year to their old home, and as none of our feathered friends are more valuable than they, we should give them every encouragement to do so.

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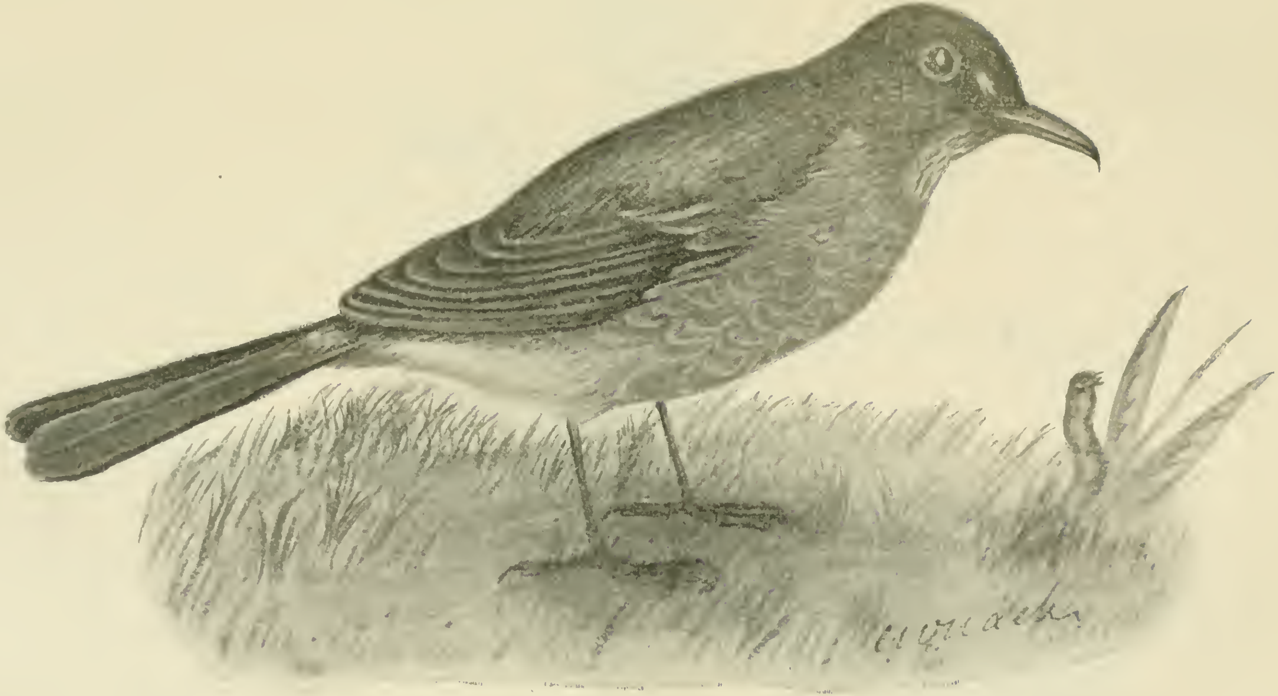
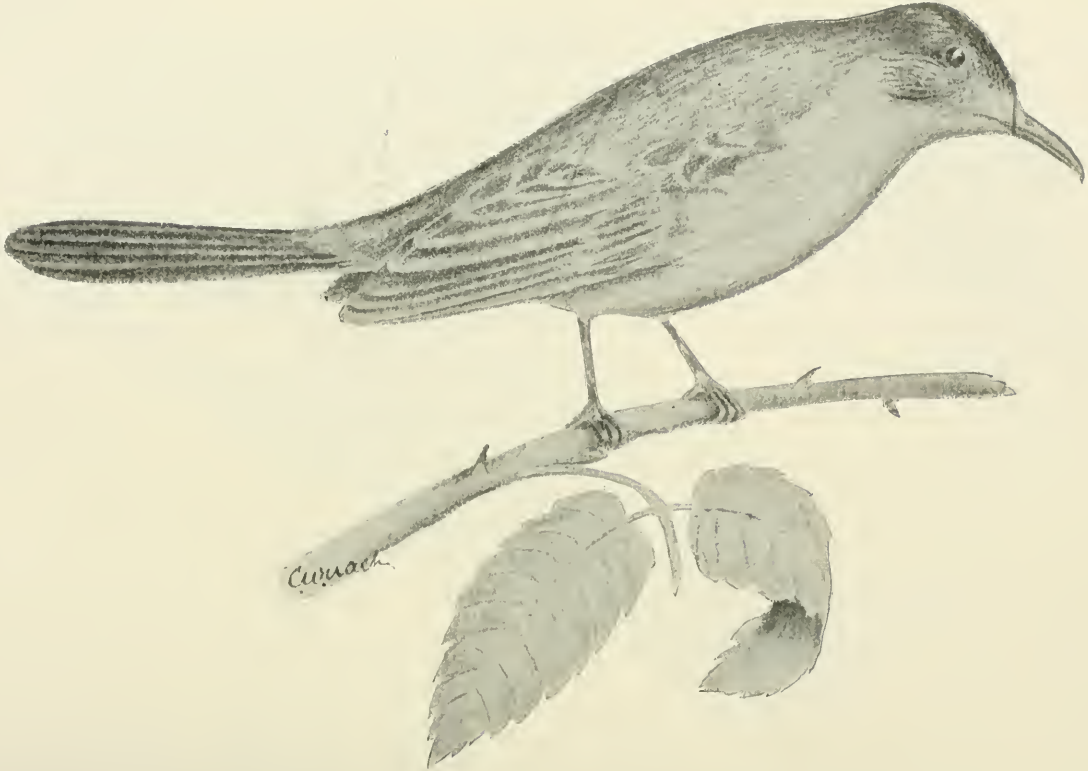
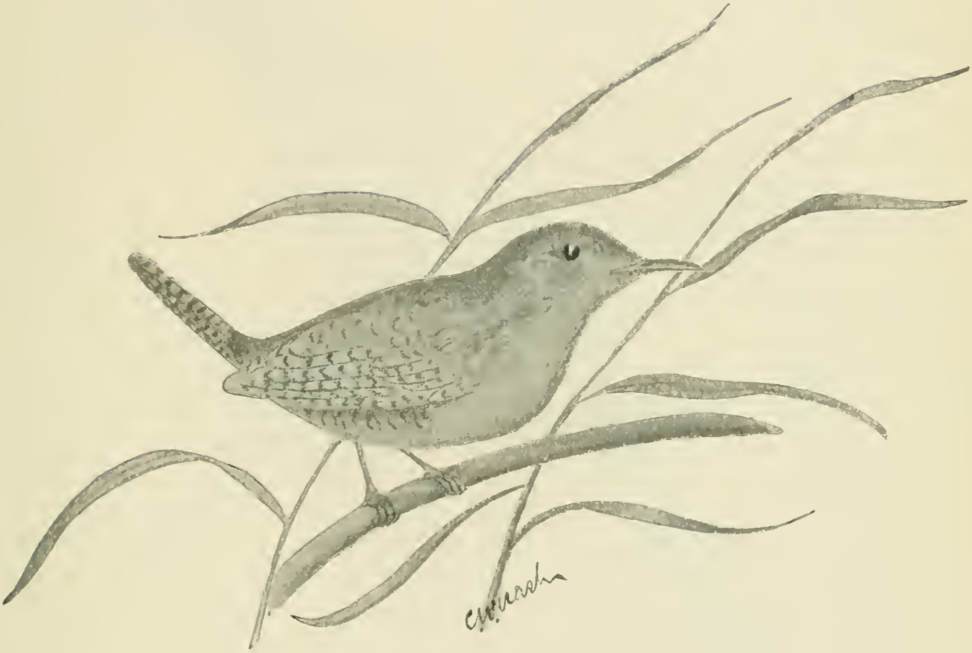


Robin

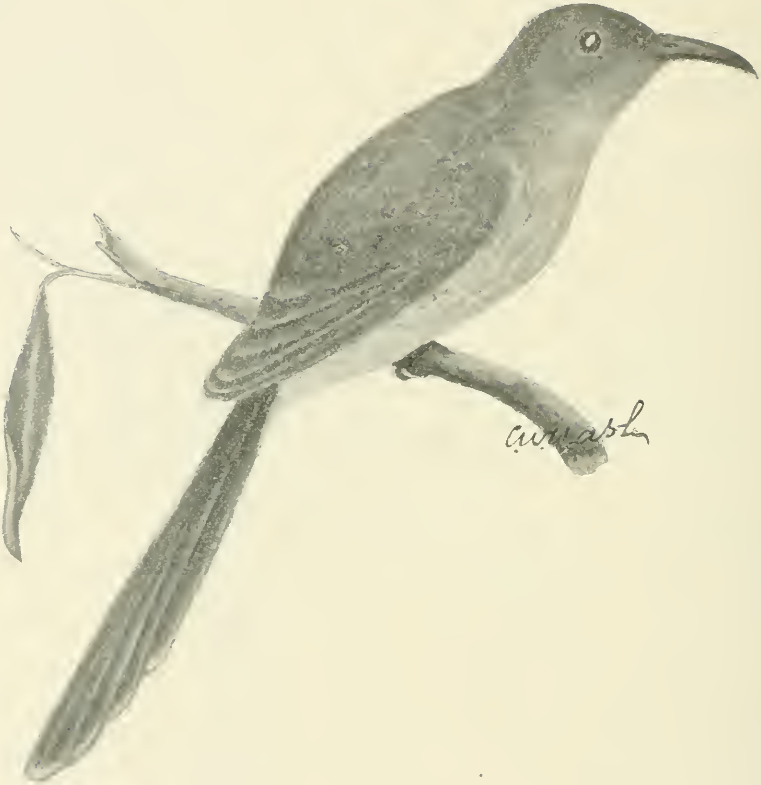
Merula migratoria



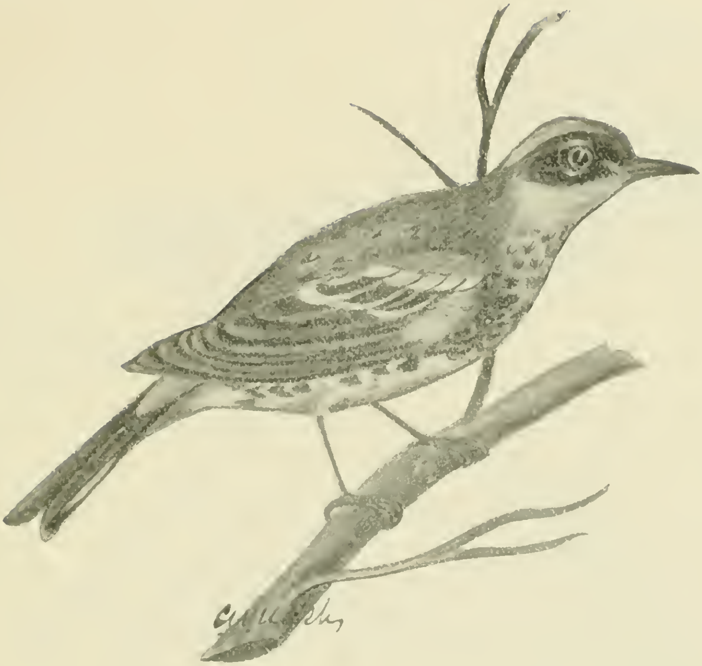
Cat Bird
Galeoscoptes carolinensis



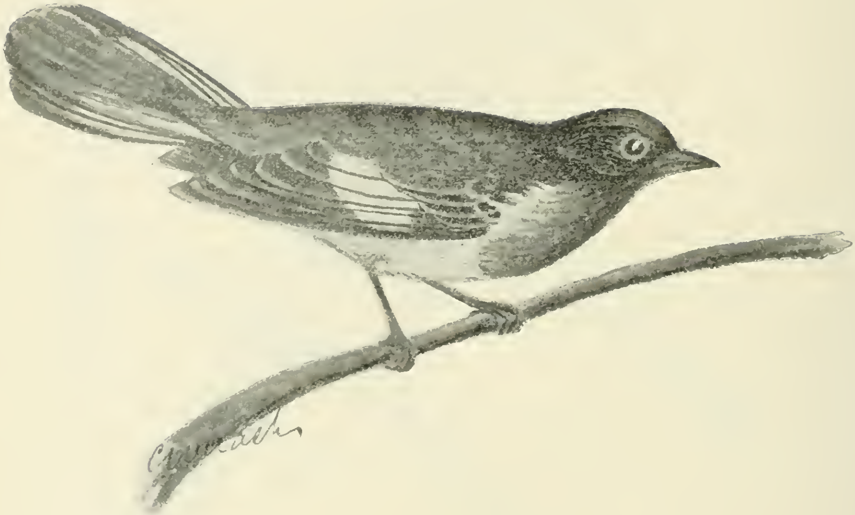
HOUSE WREN
Troglodytes aëdon



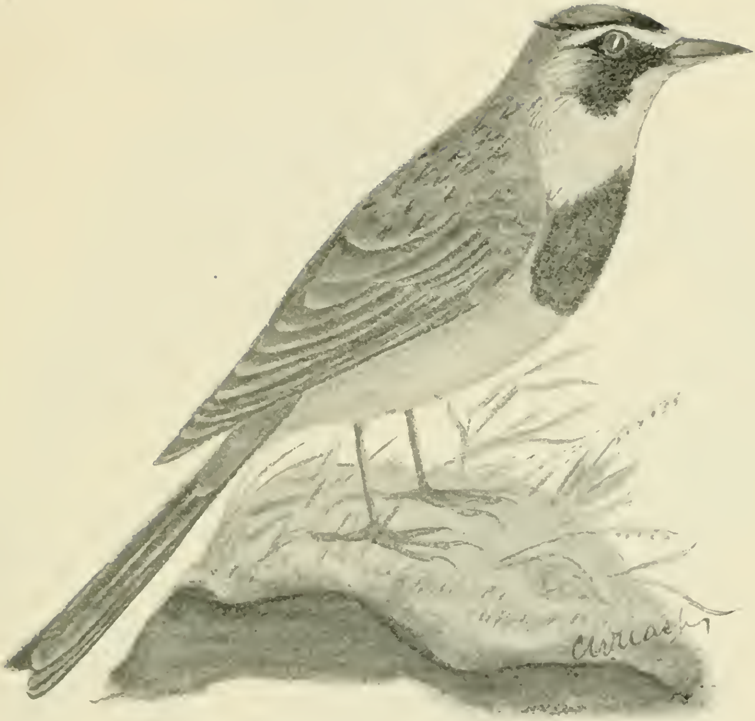
Black-billed Cuckoo
Coccyzus erythrophthalmus



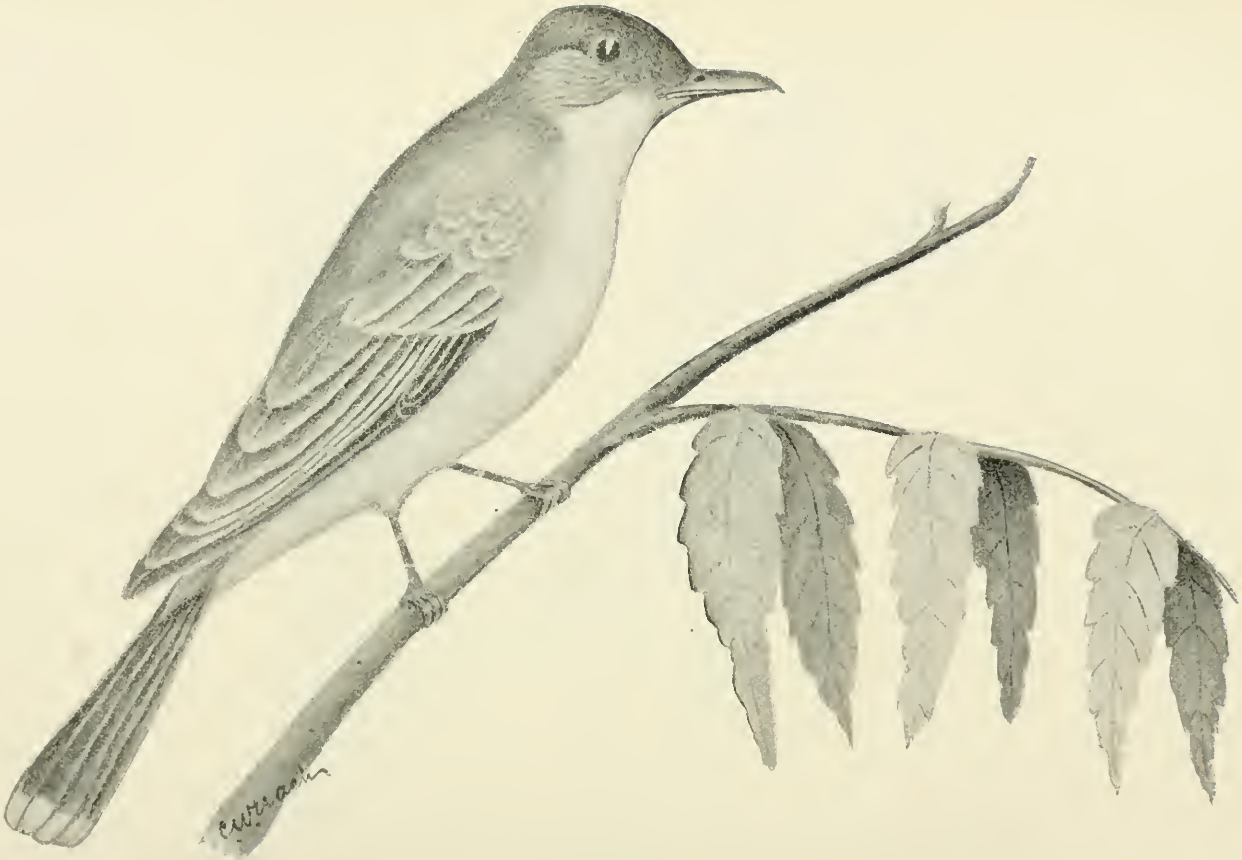
Yellow-rumped Warbler
Dendroica coronata



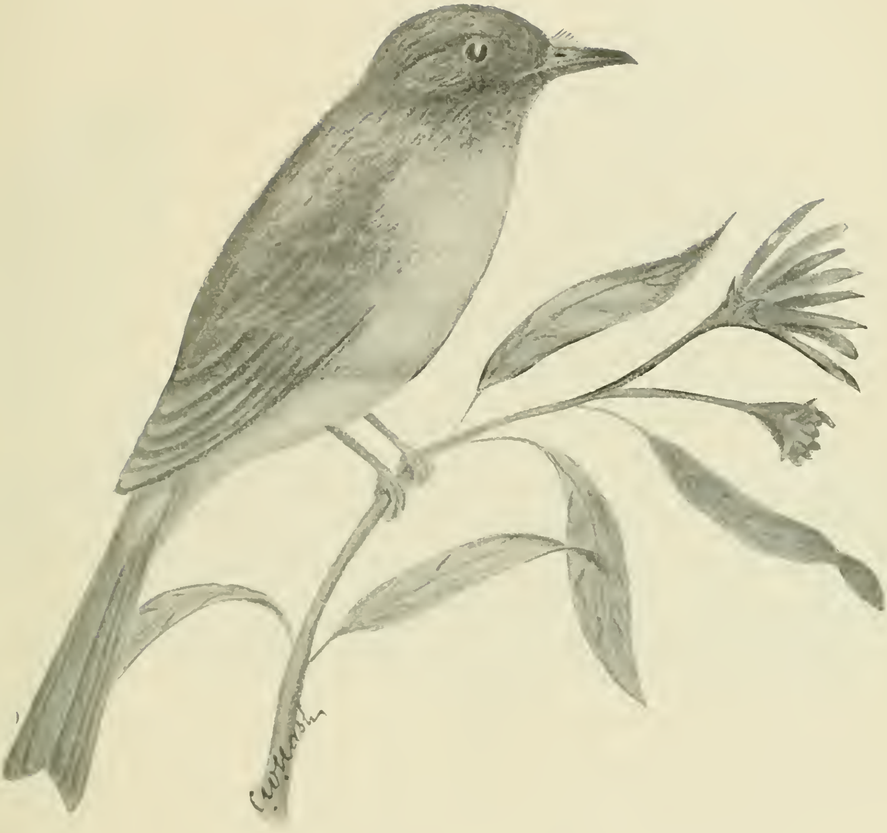
Redstart
Setophaga ruticilla



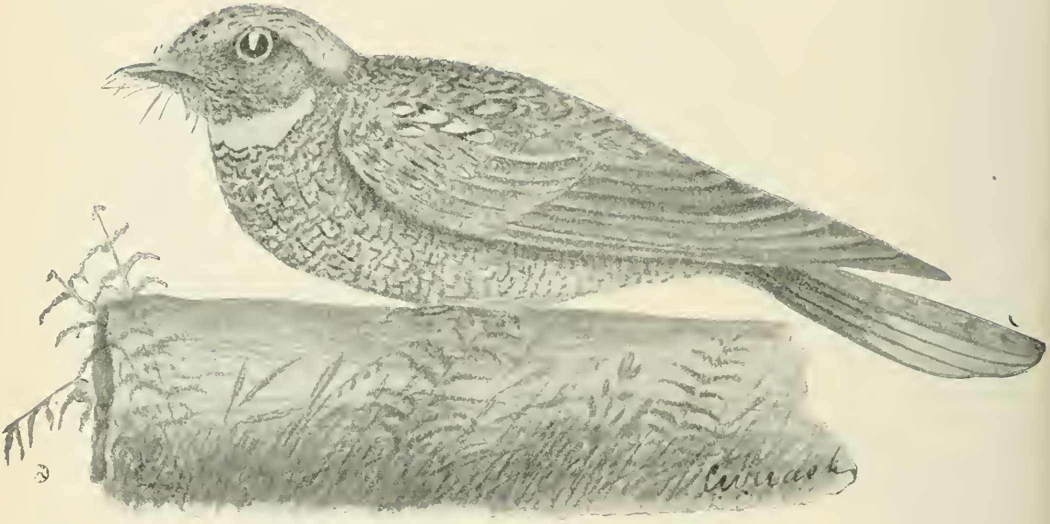
Horned Lark
Otocoris alpestris



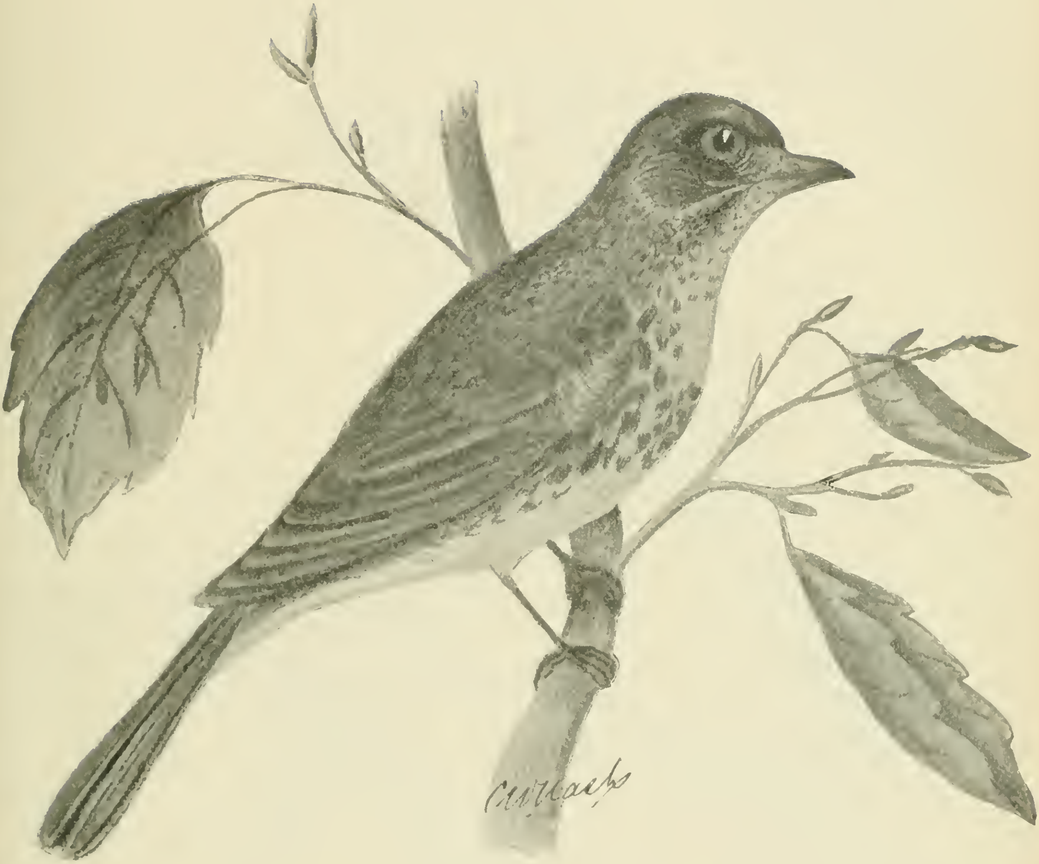
King Bird
Tyrannus Tyrannus



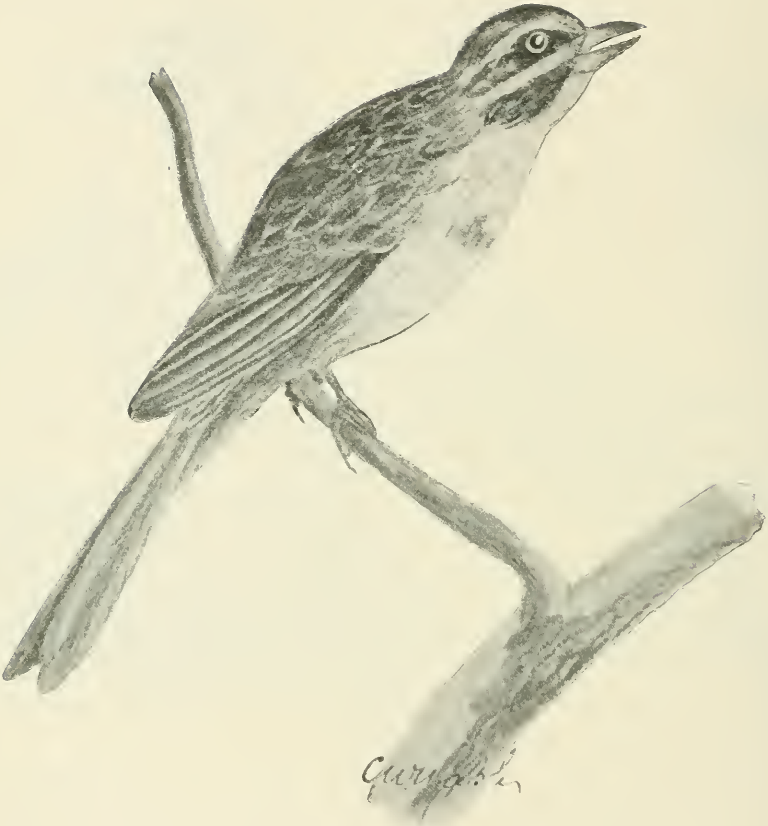
PHŒBE
Sayornis phœbe



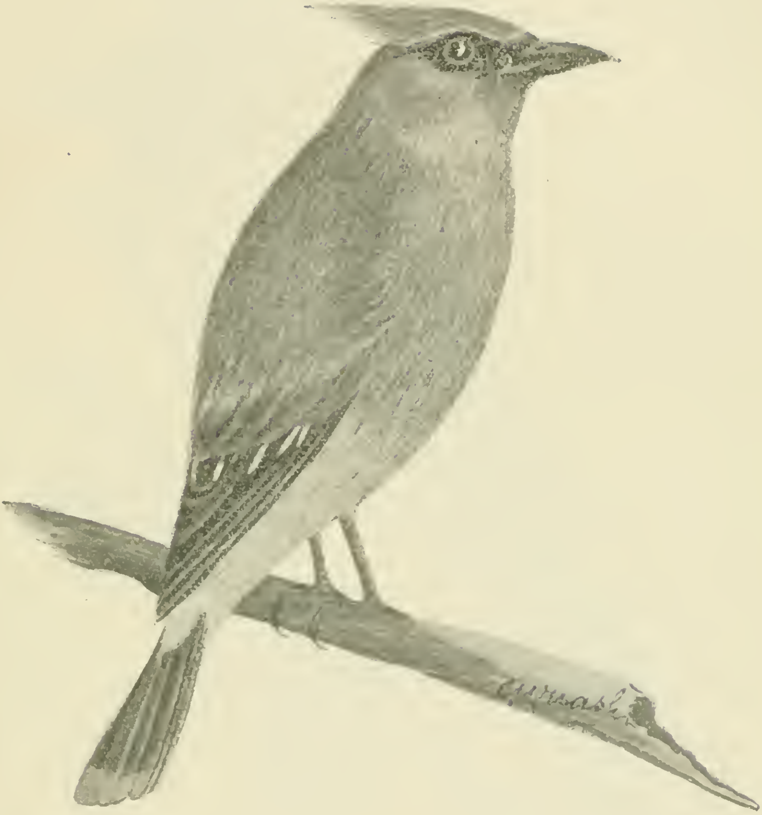
Whip-Poor-Will
Antrostomus vociferus



Fox Sparrow
Passerella iliaca

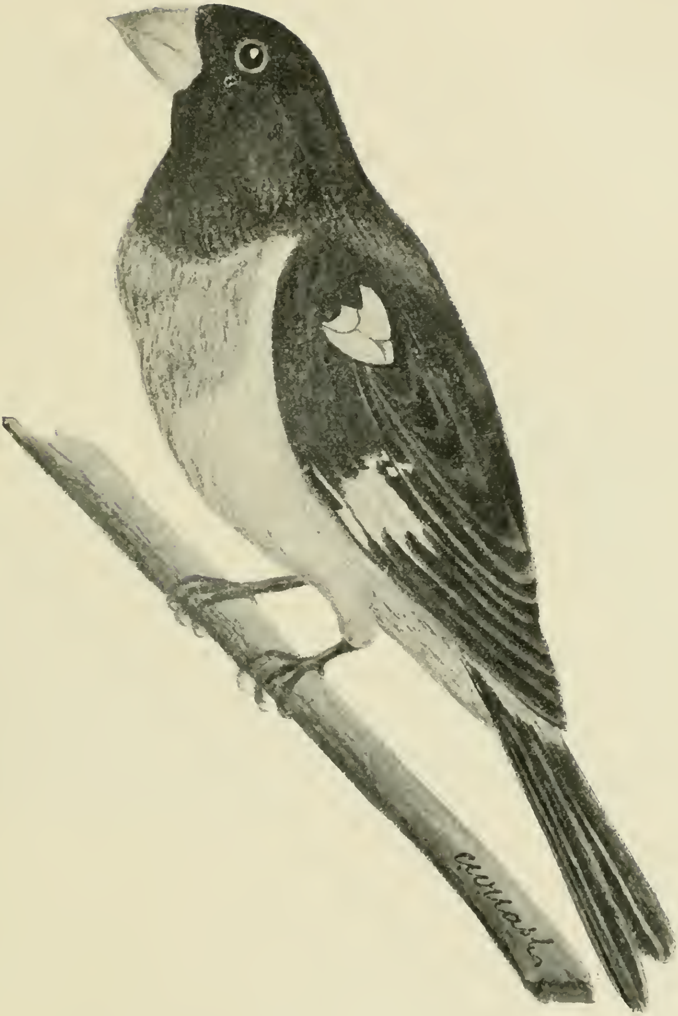


Song Sparrow
Melospiza fasciata

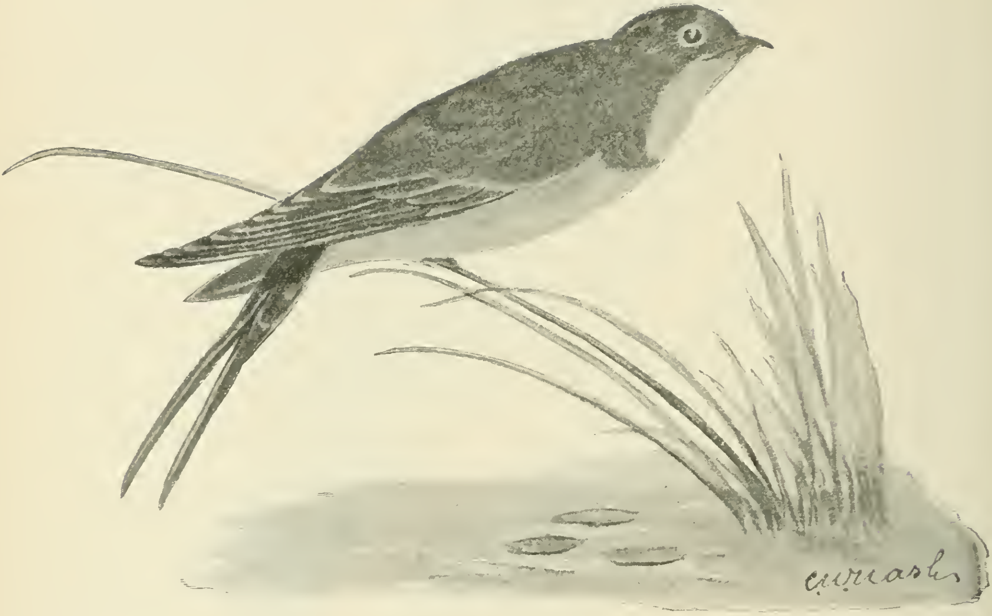


Cedar Waxwing
Ampelis cedrorum

Purple Finch
Carpodacus purpureus



Rose-breasted Grosbeak
Habia ludoviciana



Barn Swallow
Chelidon erythrogaster

I have particularly mentioned the King Bird and Phœbe because they may be regarded as typical of the whole family to which they belong. and being familiar in their habits, they are likely to be well known to every one. All the other species are more or less birds of the woods and orchards, but each one of them in its own chosen locality is rendering us good service the whole summer through.

SPARROWS, FINCHES, ETC.

This is a very large family represented in Ontario by thirty-four species. Want of space prohibits my calling attention to the food habits of each of these species in detail. It will, however, be sufficient for the purposes of this paper to refer particularly only to those which in some manner are particularly beneficial or injurious to the crops usually cultivated for profit. All of these birds are insect eaters in the summer months, and their young while in the nest are fed entirely on insects ; but in the autumn, winter and early spring, the mature birds subsist principally on the seeds of wild plants and forest trees.

The Rose-breasted Grosbeak is one of the largest and most beautiful of the family, and is of more than usual interest because it is one of the very few birds that will eat the Colorado potato beetle and its larvæ, and also the larvæ of the Tussock moth, this last being a hairy caterpillar, very destructive to almost all shade and orchard trees. A specimen of this bird in my possession eats both these insects readily. Unfortunately, these Grosbeaks are of a retiring disposition, and usually resort to the seclusion of the woods, but it is one of the few species that seems to be increasing in Ontario, and if unmolested it may possibly become more familiar in its habits. If so, its services in lessening the number of Tussock moths would be of great value. None of the native members of this family are addicted to eating the ordinary grain or fruit crops, but the Purple Finch (the adult male of this species is crimson, not purple) in the spring is sometimes injurious in orchards and gardens, where it destroys the buds of fruit trees. They will also devour great quantities of sunflower and other seeds. They are not, however, generally sufficiently numerous to cause much loss.

A member of this family about which there has been much controversy, is the imported European House Sparrow. This bird was introduced into Ontario about the year 1873 by some gentlemen who no doubt were under the impression that the sparrows would devote themselves exclusively to killing and eating the caterpillars that infest the shade trees in our towns. They either forgot or did not know that the sparrow belongs to a class of birds whose diet consists of vegetable substance and insects in about equal proportion, and that the Sparrow, having attached itself to the haunt of man, usually obtains its vegetable food from the plants and seeds cultivated by men for their own use. I have read many reports of so-called observers, who have stated that the House Sparrow never eats insects of any kind, that it drives away our native birds, and that it is altogether an unmitigated nuisance. Sweeping assertions of this kind are only conclusive evidence that the so-called observer cannot observe. No one with ordinary perceptive faculties can walk through our public parks, or along one of our streets where there are trees and grass in the summer time, without seeing some Sparrows industriously hunting for insects with which to feed their young, and should anyone have a sparrow's nest under his verandah or about his house in such a position that some of the food brought by the parent birds to their young will fall where it can be seen, the proof that they do eat insects, and in large quantities too, will be very clear. The old birds also eat insects at this season, varying their diet with such undigested grain as they may find in horse droppings, and with bread crumbs and such like refuse from houses.

Sparrows, like the majority of birds, will not eat hairy caterpillars, but I have seen them eat the spiny larvæ of *Vanessa antiopa*, which is one of our shade tree pests that few birds will touch. Besides this, I have seen them take moths of almost any kind, including the large Cecropia and Luna moths and the Tussock moth (both the winged male and the wingless female), beetles of many kinds, even such large species as the aquatic

Dytiscus, which they find on the sidewalks beneath the electric lights to which the beetles are attracted at night, the green cabbage worm (the larvæ of the cabbage butterfly)—of these they eat great numbers. They also hunt about fences, and take the pupa of this same butterfly. The currant worms and the mature insect are also taken in large numbers, as are also grasshoppers, and both the black and green aphides that occur on apple trees and rose bushes are eaten greedily. On one occasion a flock of Sparrows completely cleaned off the green aphis from some rose bushes near my windows. It took them several days to finish their work, but they did it effectually in the end.

About harvest time the Sparrows show their grain-eating proclivities. They then gather into large flocks, and, leaving the town where they were bred, visit the surrounding country and make serious raids upon the wheat and oats, and do more damage while the grain is standing by beating it out than by eating it.

It is in early spring, however, that the worst trait in the Sparrow's character becomes apparent. Vegetation awakens after the long winter's sleep; the trees put forth their buds, and seedlings break through the soil. The Sparrow, probably needing an alterative after the hard fare of the winter, attacks all these; nothing green comes amiss to him, and then the gardener, wrathful at the loss of prospective fruit, vegetables and flowers, forgets the good qualities the bird has, and would have the whole tribe exterminated. Whether or not he would be the gainer by this is somewhat difficult to decide. My own opinion at present is, that the number we now have do as much good as they do harm, but that they should not be allowed to increase to any great extent.

The Sparrow is also charged with driving away our native birds. This charge is well founded only in the case of such birds as were formerly in the habit of building in holes and crevices about our houses, such as the Swallows and the Wrens. In the case of the Wrens the difficulty can easily be got over by placing their nest boxes low down, say about eight feet from the ground; the Sparrows will not then occupy them. But the Swallow problem is not so easy to solve. The trouble arises from the fact that the Sparrows remain here all through the winter and use the Swallows' nests in that season as roosting places. As spring comes they build in them and so have possession when the Swallows return from the south. As they then, naturally enough, decline to turn out, the Swallows have to seek elsewhere for a home; the result being that we lose a very valuable, purely insectivorous bird and get in the place of it one whose value is questionable. Continually shooting off the Sparrows as they appear seems to be the only remedy, and I think eternal vigilance would be required to make it successful in any place where the Sparrows are well established.

That Sparrows are rather quarrelsome amongst themselves in the season of love-making, is evident to everyone, but so far I have not seen them interfere with any other species whose nesting interests do not conflict with theirs. In my own neighborhood, House Wrens, Orioles, Vireos, Cat Birds, Wilson's Thrushes, Robins, Chipping Sparrows, Song Sparrows, the American Goldfinch, and the Yellow Warblers have all bred in close proximity to many pairs of Sparrows and have not been interfered with by them; but if I had not kept a pretty close watch over the nests, and taken out the eggs of the Cow Birds which were deposited therein, but few broods would have been successfully raised.

The Sparrow has one particularly good trait which should not be overlooked; that is, its fondness for the seed of the knot grass or knot weed. This pernicious plant frequently appears on our boulevards and lawns and destroys the grass completely. The Sparrows soon find it out, and small parties constantly visit it and feed upon it, so that it is kept down and in some cases is quite cleared out.

THE SWALLOWS.

Of this family we have five species, viz.: the Purple Martin, the Barn Swallow, Cliff Swallow, White-breasted Swallow and Sand Martin, all regular summer residents. Another one, the Rough-winged Swallow, occasionally occurs here, but as it closely resembles the Sand Martin its appearance is not readily noticed.

The economic importance of these birds is very great; without them the smaller winged insects would multiply to such an extent as to become an unbearable nuisance to men and animals; for it is, I believe, to these birds chiefly that we are indebted for our freedom in the cleared and cultivated parts of the country from the swarms of midges, black flies and gnats of various kinds that so abound in the woods.

These birds seem to have a great predilection for the society of men, partly because the clearing he makes in a forest country opens up to them the necessary space for feeding grounds, and partly because the buildings he erects afford them convenient nesting places, of which the House Sparrow unfortunately is dispossessing them.

Except in very stormy weather the Swallows usually capture their food whilst they are on the wing, but in the cold windy days that frequently occur in early spring the insects on which they depend are too chilled to fly, and then the Swallows seek them in open places on the ground. The sandy shores of our lakes are particularly resorted to at such times.

In the latter part of July and the beginning of August the large female ants swarm from their nests, each one prepared to found a colony for herself were she permitted; the Swallows, fortunately for us, however, interfere and gorge themselves upon these creatures, the Purple Martins particularly, destroying vast numbers of them, even after the ants have divested themselves of their wings; when this has taken place the Martins alight on the ground pursuing them there with the greatest activity.

The Chimney Swift, which closely resembles the Swallow in its habits, except that it never alights on the ground even to obtain the materials for its curiously constructed nest, may be mentioned in connection with them, its economic value being equally great.

Night Hawks. All the Swallow tribe gather their food during the day, and the hotter and brighter it is the more active they seem to be; the Chimney Swift's period of greatest activity is the early morning and late evening. The Night hawk and Whip-poor-will commence their work at dusk and keep it up till sunrise. Their food consists, for the most part, of the large night-flying moths and beetles; on one occasion, however, I found the stomach of a Whip-poor-will filled with the large female wingless ants, which could only have been obtained from the ground and in all probability in the day time.

The common June Bug is a favorite article of food with both these birds, and as this is a very destructive insect both in its larval and mature stages, the birds are entitled to our best consideration for the good work they do in lessening its numbers. None of the Swallows, Swifts or Night Hawks ever under any circumstances take any vegetable food, nor have they any habits that are open to objection of any kind, so that our utmost efforts should be put forth to preserve them and encourage them to build about our premises.

I have heard one or two people state that they did not like Swallows about their houses because they brought bed bugs; how such an idea got into any person's head is difficult to understand, and let me say most emphatically that there is no foundation for the belief whatever. Swallows, like all other living creatures, have their insect parasites, but no parasite affecting the Swallows will ever trouble human beings.

CONCLUSION.

There are other families of birds more or less directly beneficial or injurious to our interests but space will not permit an extended notice of each. I hope enough has been said to impress upon the mind of every one the great value of the majority of our birds to the agriculturist.

I have seen some estimates of the amount of damage done to the crops by insects in various countries, including our own Province, and although they usually stand at some millions of dollars annually, I believe they are much below the mark. It is difficult to form an estimate of the yearly loss from this cause to ordinary field crops, because the plants are crowded so thickly together that a large proportion may be destroyed in the earlier growing stages without being noticed, and it is only when the matured crop fails to reach the expected quantity that we realize the fact that something has gone wrong, but unfortunately it is then too late to remedy the matter. In our gardens we can more readily see the amount of injury done by insects, and can take measures to reduce it, but in spite of our efforts the loss is still enormous, and consider what it would be if we had not the birds to assist in keeping down the swarm of insect life; the great trouble now is that we have not a sufficient number of birds to keep the balance between vegetable and insect life in our favor.

We all know that the common cut-worm causes great loss every year in spite of the fact that almost all our ground-feeding birds eat great numbers of them and that the birds that feed among the trees and on the wing destroy very many of the moths which produce them, and so we can easily imagine what the result would be to the crops if these creatures were allowed to increase unmolested by their natural enemies; so prolific are they, that I believe the increase of one season would provide a sufficient number to clear off all the crops we cultivate.

A constant war is being carried on between the insect world and the vegetable kingdom. The laws of nature would keep the balance about evenly adjusted. But man requires that it should be inclined in favor of the plants he cultivates for his own use. To obtain this end it is necessary that we should carefully protect and encourage all the forces that will work on our side against our insect enemies, and while they are not the only ones, yet the birds are the most important allies we can have in the struggle. We cannot very well increase their number or efficiency by any artificial means, but we can protect them from such of their natural enemies as occur in our own neighborhood, and we can encourage them to remain and breed about our farms and gardens. If this was done all over the country generally, we should find ourselves amply repaid for the small amount of trouble expended, by the protection they would give our plant life against its destructive enemies.

ACT FOR THE PROTECTION OF INSECTIVOROUS AND OTHER BIRDS.

Chap. 289, R. S. O. 1897.

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

1. Nothing in this Act contained shall be held to affect *The Ontario Game Protection Act*, or to apply to any imported cage birds or other domesticated bird or birds generally known as cage birds, or to any bird or birds generally known as poultry.

2.—(1) Except as in section 6 of this Act provided, it shall not be lawful to shoot, destroy, wound, catch, net, snare, poison, drug, or otherwise kill or injure, or to attempt to shoot, destroy, wound, catch, net, snare, poison, drug or otherwise kill or injure any wild native birds other than hawks, crows, blackbirds and English sparrows, and the birds especially mentioned in *The Ontario Game Protection Act*.

(2) Any person may, during the fruit season, for the purpose of protecting his fruit from the attacks of such birds, shoot or destroy, on his own premises, the bird known as the robin without being liable to any penalty under this Act.

3. Except as in section 6 of this Act provided, it shall not be lawful to take, capture, expose for sale or have in possession any bird whatsoever, save the kinds hereinbefore or hereinafter excepted, or to set wholly or in part any net, trap, spring, snare, cage, or other machine or engine, by which any bird whatsoever, save and except hawks, crows, blackbirds, and English sparrows, might be killed and captured; and any net, trap,

spring, snare, cage or other machine or engine, set either wholly or in part for the purpose of either capturing or killing any bird or birds save and except hawks, crows, blackbirds and English sparrows, may be destroyed by any person without such person incurring any liability therefor.

4. Save as in section 6 of this Act provided, it shall not be lawful to take, injure, destroy, or have in possession any nest, young, or egg of any bird whatsoever, except of haws, c ws, blackbirds, and English sparrows.

5. Any person may seize, on view, any bird unlawfully possessed, and carry the same before any justice of the peace, to be by him confiscated, and if alive, to be liberated ; and it shall be the duty of all market clerks and policemen or constables on the spot to seize and confiscate, and if alive, to liberate such birds.

6. The chief game warden for the time being, under *The Ontario Game Protection Act*, may on receiving from any ornithologist, or student of ornithology, or biologist, or student of biology, an application aud recommendation according to the forms A and B in the schedule hereto, grant to such an applicant a permit in the form C in said schedule, empowering the holder to collect, and to purchase, or exchange all birds or eggs, otherwise protected by this Act, at any time or season he may require the same for the purposes of study, without the liability to penalties imposed by this Act.

7. The permits granted under the last preceding section shall continue in force until the end of the calendar year in which they are issued, and may be renewed at the option of the chief game warden for the time being under *The Ontario Game Protection Act*.

8.—(1) The violation of any provision of this Act shall subject the offender to the payment of not less than one dollar and not more than twenty dollars with costs, on summary conviction, on information or complaint before one or more justices of the peace.

(2) The whole of the fine shall be paid to the prosecutor unless the convicting justice has reason to believe that the prosecution is in collusion with and for the purpose of benefitting the accused, in which case the said justice may order the disposal of the fine as in ordinary cases.

(3) In default of payment of the fine and costs, the offender shall be imprisoned in the nearest common gaol for a period of not less than two and not more than twenty days, at the discretion of the justice.

9. No conviction under this Act shall be quashed for any defect in the form thereof, or for any omission or informality in any summons or other proceedings under this Act so long as no substantial injustice results therefrom.

TO THE COUNTRY SCHOOL CHILDREN OF ONTARIO.

By Joseph Bawden, Kingston, Ont.

You are asked to help in the care of little birds which visit Ontario in large numbers, some to remain throughout summer and autumn in the neighborhood of the farm house, while others pass on their way to breeding grounds in the northern forests. You may contrive to get some to stay that will help in the destruction of insect pests of fields and orchards, as well as of cattle, horses and sheep.

Swallows, tit-mice and wrens have in so many cases given up their nest-building habits to lodge in bird-houses thut it is likely you will be successful in an effort to coax some to take up their dwelling in the breeding season in empty fruit and vegetable cans properly placed to secure privacy and shelter for your feathered guests.

It is recommended to clean thoroughly the cans to be used. Remove sharp edges and splinters. Make four small holes of the size of a pea in the bottom, for ventilation. Mix a wash of earth or mud with a little flour and give a good coat inside and out. When dry fasten the cans, with the openings pointing north-east, in the crotches of innermost branches of such trees as you may conveniently climb without injury. Secure the cans in place with string and wire. In orchards visited by the oriole, or Baltimore robin, it may be possible to get a tenant to take lodging in an empty marmalade can such as Upton's. Give it a coat of neutral-colored wash and secure the can with wire so that it may hang pendulous about thirty inches from the outer limb of an elm tree. To invite the birds to become tenants of your house to let, unravel some old stockings and put bundles of strands of yarn, narrow strips of cotton, wollen or silk, with tufts of horsehair and strands of old rope or twine under the top rails of an orchard fence, or hanging from an eave of the barn, and here and there among the branches of trees. Put one can only in a tree.

If sparrows should come too freely to your bird lodgings you may find it advisable to remove them for a few days in the early part of the season, putting them up in other parts of the orchard or woods a few days later on.

It will be of interest to note the arrival of your tenants in a book, and also their departure, taking care not to disturb any nests even after the birds have gone. Security of tenure and quiet habitations are highly esteemed by the feathered tribes.

BIRDS IN RELATION TO AGRICULTURE.

By Martin Burrell, St. Catharines, Ont.

It is somewhat unfortunate that at the time of year when birds and insects are most plentiful, and most active, the average farmer is so driven and pushed with work that he cannot, or at least does not, pay much attention to either subject. It would richly repay him to cultivate a strong habit of observation, for he would not only touch life at a greater number of points, and lighten much of the inevitable monotony of farm life in particular, but also acquire a more accurate knowledge as to his friends and enemies in the insect and bird worlds.

As regards birds, though intelligent observation will do much, the final determination of their economic status must be by means of an examination of the stomach contents. There is no evasion of the real issue here. What a bird eats, that he is as far as the farmer is concerned. To the United States Ornithological Department we owe a debt of gratitude in this respect. A vast number of analytical examinations have been made, and a great deal of useful information obtained as to the food habits of the commoner native birds. I am indebted to the Department for many of the statistics quoted in this address.

Our old familiar friend, the crow, is one of the birds whose status has always been a debatable point with farmers. He has been the recipient of a good many "cuss" words, and on the whole undeservedly, for in the main he is the agriculturist's friend. I rather like his strong, confident, if somewhat rancuous, voice. He is an optimistic fowl, cheerful and even aggressive in manner, and has earned a reputation for more than common wisdom. Long live the crow, we should miss his sable figure from our northern winter landscape.

The crow consumes large quantities of sand and gravel to assist the digestion of his food, and has the habit of disgorging what are known as "castings," which consist of pellets in which mineral matter and indigestible material, like certain seeds, the teeth of mice, snail shells, etc., are all mixed up. The chief counts against the crow are that he injures corn in the milk, pulls sprouting corn, eats fruit, and devours the eggs and young of wild birds and poultry. The relation of his animal to his vegetable food largely determines his economic position. Counting mineral matter as food we find matters thus: 33 per cent. animal food, 57 per cent. vegetable, 10 per cent. mineral. His animal food, which forms 33 per cent. of the whole, may be divided thus:

Rabbits.	Mice.	Other mammals.	Carrion.	Wild birds and eggs.	Poultry and eggs.	Tortoises.	Snakes.	Frogs and toads.	Fish.	Crawfish.	Snails.	Insects and spiders.
.5	1.1	.1	3	.6	.4	.2	.4	1 2	.4	.9	.3	23.05

The noticeable thing here is the extraordinary preponderance of insects in our friend's bill of fare. As a frog and toad eater the crow certainly does more harm than good, both these reptiles being insectivorous. On the other hand, as a rabbit and mouse destroyer he does great good I may say with regard to the above tables that they are based on the examinations of about 1,000 stomachs taken from various parts of the country and at different times of the year, and are backed also by the testimony of many hundreds of observers. It will be noticed that a very small percentage of the food is composed of the eggs and young of poultry and wild birds. Occasionally, no doubt, an immoral and reprobate crow will form this habit, but it is not general. The concentration of birds like the robin, cat bird, and brown thrasher in the orchards and garden, and the neglect of concealment of the nests on the part of the birds lead to occasional depredations by the crow. But because this robbery of the nests is thus more often witnessed we must not overestimate the harm done to small birds in general. It is, however, as an insect eater that the crow is so beneficial. An immense number of species are eaten, but he chiefly confines himself to such as are found on the surface of the ground. Those that he eats in greatest numbers are here enumerated in due order: Grasshoppers, especially in August and September; dung beetles; ground beetles; May beetles, in the larval stage known as "white grubs;" ground spiders; weevils cut-worms; soldier bugs; ants; chick beetles—in the larval form—"wire worms."

It is rather remarkable that none of the useful little lady-birds (Coccinellidæ) are eaten by the crow. In closing this reference to the insect diet, it should also be pointed out that from the end of April to June the May beetles, or injurious "white grubs," form the principal insect food of the crow. The fact that the breeding season of both crow and beetle coincide is most important, the insect food of the nestling crows being largely composed of this rascally pest.

Now, let us turn for a minute or two to the vegetable food of our sable acquaintance, which forms 57 per cent. of the whole diet. Corn comes easily first in the list, 21.5 per cent.; acorns next, 5.1; wheat, 2.8; oats, 2 4; poison ivy, 2.2; sumach, 2.3; and other grains and seeds in less proportion. Fruit forms about 7 per cent. of this vegetable diet. Of the cultivated fruits he prefers grapes, cherries and berries; occasionally he injures apples, and sometimes I have found him attacking peaches, pecking out about a third of the fruit and then passing on to another peach. But it is seldom that serious injury is done, for the main part of his fruit diet undoubtedly consists of wild fruit.

While, at first sight, the item of corn, 21.5 per cent., seems rather "agin" the crow, there is this to be said, the greater portion of it is eaten in the winter when the struggle for existence is harder, and, is largely waste grain. Strictly speaking the bird is carnivorous, and will take a good fat pungent insect every time in preference to grain. As a matter of fact 21.5 represents the monthly average. In January and February the percentages rise to 28.5 and 39.4 respectively. For May and June, when corn is "sprouting," and the click of the "planter" is heard in the land, the percentage sinks to 16, and in the fall, during the "corn-in-the-milk" season, it is only 18. It is most evident that in the "bug" season corn is relished "second best." When the nestling crows are nearly fledged, the parents have to hustle to keep those hungry voices silent—parents of all sorts, feathered and featherless, will sympathise with them—but even in that trying time sprouting corn is taken only as a "stop gap," and insects form the main food. On the whole, then, corn is not taken in sufficient quantities to condemn the crow, and the positive evil is largely outweighed by the positive good done in the insect department. It ought to be added that it is perfectly easy to guard against the damage to sprouting corn by "tarring" the seed. A little thin tar stirred in the seed corn will color every grain and effectually deter the birds from trying more than a hill or two. To work well in the "planter," some air slaked lime, ashes, or plaster should be stirred amongst the "tarred" corn till every grain is coated.

Hawks and Owls. These two classes of birds have come in for a more general condemnation, even than the crow, and chiefly, of course, on account of the alleged wholesale destruction of poultry. There is a widespread misconception as to the real facts of the case, and it may be just as well to hear somewhat about the other side of the question. Nearly every hawk or owl will seize mice and other injurious rodents in preference to birds, and it has been well pointed out by Dr. Fisher that while both hawks and owls are vilified by the whole farming community, that gigantic fraud—the house cat—is petted and protected, when it is well known that the cat destroys a large number of young birds and young chicks, preferring such diet to mice.

No doubt some of these birds of prey are injurious. In reality, out of more than forty species only three hawks and one owl can be classed as injurious. The latter—the great horned owl—is only injurious in localities where poultry run at large, roosting in trees, etc., at night. When poultry are confined at night this owl is undoubtedly beneficial. Of the three injurious hawks, the first is the large *goshawk*, the second *cooper's hawk*, a smaller but powerful bird; and the last the *sharp shinned hawk*, a much smaller hawk, which preys very largely on the smaller birds. All the other hawks and owls were chiefly beneficial, many entirely so. The good they accomplish lies in the immense destruction of mice, rabbits, ground squirrels and injurious insects. The owls carry on by night the good work done by the hawks during the day. Time will not permit of many species being touched on, but two or three types may be taken. We will glance first at two of our commoner hawks, the *Red-tailed Hawk* and the *Red-shouldered Hawk*. These are both large, powerful birds, familiarly known as "hen hawks." This is a case of "give a dog a bad name and then hang him." The truth is that sixty-six per cent. of the food of the Red-tailed Hawk consists of injurious mammals, about seven per cent. only of poultry, and a great many grasshoppers, crickets and beetles. It must be remembered too that a considerable portion of the poultry and game is made up of wounded, diseased and frost-bitten specimens. The *Red-shouldered Hawk* is still a greater friend. Ninety per cent. of his food consists of injurious mammals and insects, and it is the rarest possible thing for one of these birds to touch a fowl. The owls are as much or even more valuable as mouse destroyers than the hawks. Mice alone form as high as seventy five per cent. of the total food of some species. The smaller owls are also particularly fond of insects. The familiar little *Screech Owl* gobbles up grasshoppers, crickets, beetles cutworms, etc., in large numbers. In the stomach of one of these birds were found fifty grasshoppers, in another eighteen May beetles, and in a third thirteen cutworms. The more this phase of our subject is studied the more one feels that an indiscriminate slaughter of the birds of prey is a big blunder on the farmers' part, and a gross injustice to the great majority of the birds.

Of our commoner native song birds, etc., nearly all are extremely useful. There are some, like the Bobolink, which though useful here are highly injurious when they migrate south. Very few people realize the enormous amount of insects that a single bird will eat. No less than 217 fall web-worms have been taken out of the stomach of a Black-billed Cuckoo. With a stomach capacity of this kind what would this fellow eat during a season?

Woodpeckers are regarded unfavorably by some people, but as a class they are extremely beneficial, eating vast quantities of borers, ants, etc. The Yellow-bellied Woodpecker is occasionally harmful from his sap sucking proclivities. This is the only species which can really be called a "sap sucker," and though he undoubtedly does injure trees by drilling innumerable holes into the cambium or sap layer, yet he partially atones for it by devouring large numbers of insects which are attracted by the exuding sap. The Red-headed Woodpecker is accused of being a fruit eater. There is some truth in the charge, but it is chiefly to wild fruit that he confines himself. He is especially fond, as are many other birds, of the Russian mulberry; and the fact that birds like it, is about the only good thing I ever heard of this "fraud" amongst fruits. It will be impossible to take up in detail many of the common birds, but I will briefly touch on a few types. First those supposed to be fruit-eaters like the *Oriole*, *Robin* and *Cherrybird*, then grain-eaters and seed-eaters.

Birds such as the Oriole, Robin, Cat-bird and so on add so much to the charm of country life by their brilliant plumage, wealth of song, cheerfulness and tameness that one would want very strong evidence indeed of bad habits before he consented to their banishment or destruction. Fortunately the evidence is nearly altogether in favor of the birds. A very large proportion of the Oriole's bill of fare is made up of the injurious hairy caterpillars; other insects being beetles, especially click beetles (wire worms), bugs, including bark lice, ants, wasps and grasshoppers. Only sixteen per cent of its entire food is vegetable, and a very small portion of this is cultivated fruit. Much the same may be said of the Robin. It is true that a flock of robins may do great harm in the vineyard, and a certain amount of plundering of the cherry and berry crops is always going on, but taken the season round the good immensely outweighs the evil. Grasshoppers form one-tenth of their whole food, and in August comprise over thirty per cent. A great many other injurious insects are also eaten. Vegetable food forms about fifty-eight per cent. of the stomach contents, but the American ornithologist, F. E. L Beal, asserts positively that forty-seven per cent. is composed of wild fruits, no less than forty-one species of wild fruit having been identified on careful analytical examinations. The Cedar Wax wing or Cherry-bird is commonly thought to be a nuisance, as its name implies. During the last twelve years I can only recall one season in which this species noticeably hurt my crops. An examination of 152 stomachs in June and July showed that only nine contained any trace of cultivated cherries. Seventy-four per cent of the food consists of wild fruit and seeds, and thirteen per cent. of blackberries and raspberries, much of which also may have been wild fruit. The Cedar-bird is not a very heavy insect feeder, but it eats a good many noxious beetles, especially the elm leaf beetle.

Among grain and seed-eating birds the *Crow Blackbird* is the only one who can in any way be counted a sinner. Where these birds collect in large flocks they will undoubtedly do much harm to grain. Forty-five per cent. of their entire food is grain, but a certain amount of this is, of course, waste grain taken from the stubble. On the other hand it is a point in their favor that one-third of their food is made up of insects, and any one who has watched them following the plow or harrow knows a little about the number they can eat. The *Swamp* or *Red-winged Blackbird* is, on the other hand, decidedly beneficial, about seven-eighths of its food consisting of the seeds of such bad weeds as rag weed, barn grass, smart weed, etc., and of injurious insects.

The great benefit that birds confer on agriculturists by eating the seeds of weeds is, not generally recognized. Many of our worst weeds produce from twenty to one hundred thousand seeds on a single plant, and we should have a great deal harder fight of it if it were not for the friendly co-operation of the birds. An ingenious and clever writer in 1881 estimated that the tree sparrow alone in the State of Iowa consumed 875 tons of weed seed in a single season. The statement is reasonable enough. The writer allowed a season of 200 days; a daily consumption of one-quarter ounce to the bird; and ten birds to the square mile. All the estimates are conservative enough, and one sees no reason for doubting the truth of his conclusions. So few birds spend the winter with us in Canada that it is just as well to value those that do. Nearly everyone, however, has a warm corner in his heart for the cheerful, friendly little Chickadee. One feels towards them like Thoreau's woodman, "I like to have the little fellers about me." Not only do the chickadees eat seeds, but they find out the eggs and pupa of many of our dangerous insects on the limbs and trunks of orchard trees. Mr. Forbush, of Massachusetts, who conducted some very interesting experiments with orchard birds, found that frequently a single Chickadee would have nearly 300 eggs of the canker-worm in its stomach, and later in the season one stomach contained forty-one of the moths of the canker-worm, and as the moth lays from 150 to 200 eggs it is pretty easy to see what an enormous amount of good the chickadee does. With such concentrated food no wonder

> "The fire burns in that little chest
> So frolic, stout and self-possessed."

Before concluding, there is one bird, and one only, that can be anathematised without any reservation, to wit, the *English Sparrow.* As a matter of fact he is not specially English ; he swarms over many European countries, and his proper name is the *European House-sparrow.* This ubiquitous and irrepressible pest was first introduced to this continent in 1850, much to the astonishment of British agriculturists who had long been fighting him. For some years in the United States and Canada it has been spreading over new territory at the rate of 69,000 square miles per year. Up to the year 1870 it was regarded with a friendly eye. Since that time public opinion has changed, and to-day hardly a man can be found to say a word in the Sparrow's favor, and ornithologists unite in condemning it. The injuries caused by this bird may be ranked under four heads :

1. Injuries from its filthy habits, disfiguring and befouling shrubs, public seats, etc., and the blocking up of pipes, eaves troughs, etc., with its nests.
2. Injuries to buds and blossoms.
3. Injuries to grain.
4. Indirect injuries by the driving away of native birds.

The Sparrow will deliberately peck off the buds and blossoms of fruit and shade trees —sometimes stripping whole limbs—for no reason whatever save sheer "cussedness." Wheat and oats are the two grains which chiefly suffer. But I look upon the last count as the most serious one, viz, the driving away of the useful native birds. Usually it is the other fellow's nest that the sparrow is after ; but he will pick a quarrel with little or no provocation, and with almost any kind of bird. War once contemplated, the Sparrows don't fool away any time in trying to arrange matters diplomatically. They sail into the fight and by the force of numbers, by perseverance, and sheer pugnacity, soon drive their opponents from the disputed territory. About 100 species of birds are molested, but those chiefly disturbed—all extremely useful—are the Bluebirds, Martins and Swallows, Robins, Wrens, native Sparrows and Orioles. Some people still entertain the fond idea that the House-sparrows do good by eating many of the common insects. The late Prof. Panton saw them feeding on the army worm, and others have reported somewhat similar cases. There is no doubt that the Sparrow does eat a certain amount of injurious insects, such as the cabbage-worm, army-worm, canker-worm and so on, but it destroys about the same number of beneficial insects. Moreover—and this is the important fact—the injurious insects that it attacks are attacked to much better purpose, and kept far more thoroughly in check, by the native birds that the sparrows drive away. The Sparrow will eat the canker worm, but it rarely or never eats the moth or eggs, whilst the Robin or other birds do both. Then again some of our worst shade tree pests, like the elm leaf beetle, and the Tussock moth are not touched by the Sparrows, whilst the orioles, robins and cuckoos would eagerly devour them. The late Dr. Riley, Chief Entomologist of the United States, stated as his emphatic belief that the great and deplorable increase of the Tussock moth in the towns and cities was due to the presence of the Sparrows which will not touch these hairy larvæ, and the consequent absence of native birds which will do so. If there were no Sparrows in the cities, a large number of other birds would soon take up regular quarters there. And who wouldn't prefer a Bluebird, an Oriole, a Robin, to a twittering, chattering, impudent, quarrelsome beggar like the Sparrow? As to the relative uselessness of the latter in destroying insects, here are the contents of the stomach of a Yellow-billed Cuckoo shot in June 22, 1887 : 250 half-grown web-worms, one large beetle, one large plant bug, and one snail. The insect contents of this bird's stomach exceeded in bulk the insects contained in more than 500 Sparrow stomachs ! By all means, then, let us discourage the House sparrow. A great deal can be done by trapping, and by poisoning, and much by the systematic destruction of nests and eggs.

In conclusion, let every man do what lies in his power to to encourage and protect the native birds We have an excellent law on the Statute book which demands the protection of all birds save hawks, crows, blackbirds and English sparrows. Even some of these are worthy of protection. Fortunately they can protect themselves pretty well. Let us see to it that the law is made effective both in the letter and spirit. So shall we have the satisfaction, not only of seeing more frequently these beautiful visitants of our northern world, and of hearing more often those voices "singing of summer in full-throated ease," but of feeling that our feathered friends are our companions and efficient allies in the fight against noxious insect enemies.

THE RELATIONS OF BIRD LIFE TO AGRICULTURE.

By Joseph Bawden, Kingston, Ont.

A division of biological science which treats of the food of our native birds is called Economic Ornithology. Observation of the feeding habits of living birds and examination of the food contained in the stomachs of killed birds, supply a fund of information of much value to the farmer and gardener, which commends the researches of investigators in this field of Natural History. Our provincial Entomological Society has an ornithological section which as yet has accomplished little in this field of study. It is to the labors of the Ornithologists of the United States Department of Agriculture, S. D. Judd and F. E. L. Beal, and the Ornithologists of some of the State Boards of Agriculture, that we must turn for reports of investigations which open up a wonderful view of the relation of bird life to insect life and plant life in the economy of nature.

How far the conditions and extent of native bird life have been disturbed by the fiery waste of vast forest areas which has befallen Ontario in the last half century little is known. The passenger pigeon which periodically appeared in vast flocks throughout Ontario fifty years ago is over large areas rarely seen. The migrants which breed in the far north, and on their way southward once found shelter and food throughout leagues of forests, must now hasten their journey to winter quarters, probably leaving us a remainder of insect life in the egg or later stages, which, under a larger forest protection of the birds, would have been destroyed. It would be interesting to know whether the time of return of any species across our southern border has been hastened or not by the destruction of the forest.

On the other hand it may not be doubted that the cultivation of what was once pathless forest has increased the food supply for many birds, some predaceous, some beneficial, and that shelter and the presence of human enemies of the hawk kind have afforded a degree of protection of several species more favorable to their increase than natural conditions. The nesting habits of some have undergone change, and it is evident that much may be done to encourage and protect the nest-building of some of the most useful birds to whose partial domestication we may become indebted for the removal of destructive insect pests.

Nidification, or the nest-building of birds, is often changed under the pressure of circumstances. The Cliff or Bank Swallow has taken to the barn, and will freely adopt any safe bird-house built for him. The Wren will leave the hole in an apple tree which has become uncomfortable, or is dangerously exposed to the chance visit from a predatory crow or hawk, for the security of a tomato can fastened in the crotch of the tree or nailed to the side of the barn. Prof. L. H. Bailey, of Cornell University, in a "Teacher's Leaflet for use in Public Schools," gives some pretty sketches of bird-house architecture with the following specifications :

"The floor space in each compartment should be not less than five by six inches and six by six or six by eight may be better. By cutting the boards in multiples of these numbers one can easily make a house with several compartments ; for there are some birds, as Martins, Tree Swallows and Pigeons, that like to live in families or colonies. The size of the doorway is important. It should be just large enough to admit the bird. A larger opening not only looks bad, but it exposes the inhabitants to dangers of cats and other enemies. Birds which build in houses, aside from Doves and Pigeons, are : Bluebirds, Wrens, Tree-Swallows, Martins, and sometimes the Chick-a-dee. For the Wren and Chick-a-dee the opening should be an inch-and-a half auger hole, and for the others it should be two inches. Only one opening should be provided for each house or compartment. A perch or doorstep should be provided just below each door. It is here that the birds often stop to arrange their toilets, and when the mistress is busy with domestic affairs indoors the male bird often sits outside and entertains her with the latest neighborhood gossip. These houses should be placed on poles or on buildings in somewhat secluded places. Martins and tree swallows like to build their nests twenty-five feet or more above the ground, but the other birds usually prefer an elevation less than twelve feet. Newly-made houses, and particularly newly-painted ones, do not often attract the birds."

If the homestead affords tree shelter the first care should be to see that its protection has not been seized by the English Sparrow. The indictment of this bird as a "beast of prey" upon the Robin and Wren has been fully established. Sylvester D. Judd says : "It is a pity that the quarrelsome English Sparrow cannot be exterminated, for if in place of every dozen sparrows there was one house Wren, our churches and statues would present a more sightly appearance, while in the country the yield of crops would be greatly increased. At Cambridge, Mass., the Sparrow has driven the wren away by occupying its nesting places. This is true to a certain degree wherever the two birds have met. To secure the services of the Wren, the farmer must put up nesting boxes and declare war against the Sparrow.'

Having dispossessed the Sparrow, Wrens and Chick-a-dees may be encouraged at the approach of winter to stay near the homestead by hanging from the branch of a tree a shin bone or two of an ox or pieces of any stringy meat or suet. This they will tear and pick during inclement weather when the usual diet is scanty or difficult to be got at. I would here refer to an interesting paper with hints on this point by E. H. Forbush, Massachusetts State Ornithologist, in the 25th Report of the Ontario Entomological Society. In the 19th Report of the same Society, Mr. W. E. Saunders says of the English Sparrow :

"Some people in the country realize the fact that this bird is an unmitigated nuisance ; one striking case having recently been brought to my knowledge, where a farmer living close to the city limits of London, where these birds abound, goes to considerable trouble to prevent their permanent access to his farm, and as a result the trees around his house and over his farm are inhabited by such birds as the Orioles, Vireos, Tanagers, Warblers and others, whose brilliant plumage, sweet voices and entertaining ways far more than repay him for his expenditure of time and trouble in protecting them, while they render him untiring service in ridding his farm of noxious insects which would otherwise multiply at his expense. On the contrary, other farms with which I am familiar, as a result of indifference, have for their bird music the strident tones of the Sparrows, and instead of having the foliage of their trees and shrubs kept in good condition by the ceaseless activity of our native songsters, their homes are made foul, their tempers tried and their crops attacked by this intruder, who takes upon himself the onus of crowding out many and driving out more of the original avian inhabitants."

Mr. Saunders mentions that in St. Thomas a fund was raised by private subscription, and the members of an association, mostly boys who have the good of the birds and their country at heart, gave their own captures and services free, and spread the news over the town that so much a dozen would be given for eggs and so much each for heads; and the spread of Sparrows in that city promptly received a severe check.

The House Wren and Chickadee easily take the palm of merit as insectivorous birds. The latter is a protector and guardian of forest trees and timber. The former chiefly befriends the agriculturist. In the stomachs of Wrens examined in the laboratory in Washington 98 per cent. of the food consisted of insects. Half of this quantity consisted of grass-hoppers and beetles, the other half being made up of nearly equal quantities of caterpillars, bugs and spiders. Eleven per cent. of the food in June consisted of weevils. The Meadow Lark takes high place as an insectivore. The smallest quantity of insect food in any one of six stomachs was eight per cent. of the whole, the largest quantity 95 per cent., the average for all nearly half of the total food. Grasshoppers, locusts and crickets made by far the most important element, averaging 29 per cent. of all food consumed during the year. The Baltimore Oriole or Golden Robin deserves a meritorious place as an insect eater, the most important part of its food consisting of caterpillars, while next in rank as enemies are the click beetles and their larvæ known as wireworms, of which Prof. Comstock says "There is hardly a cultivated plant that they do not infest."

The birds will themselves in the most practical matter-of-fact way tell the story of their relations to agriculture if only the youth of the country will enter upon the task, at once amusing and instructive, of supplying them with bird houses and providing for the food of those who may winter with us the small addition of meat above recommended. In no better way can the study of ornithology be introduced into schools. In some States a "bird day" has been proposed to be set apart as a holiday for bird-house building and instruction in bird life. There is no doubt that if zealously taken up and earnestly pursued, our school children would be able in a few years to add something of value to our knowledge of bird and insect life. It will be a positive boon to afford to them in this simple way, and so little cost, an opportunity to interrogate nature and cultivate habits of observation.

GOOD ROADS DEPARTMENT.

ROAD REFORM.

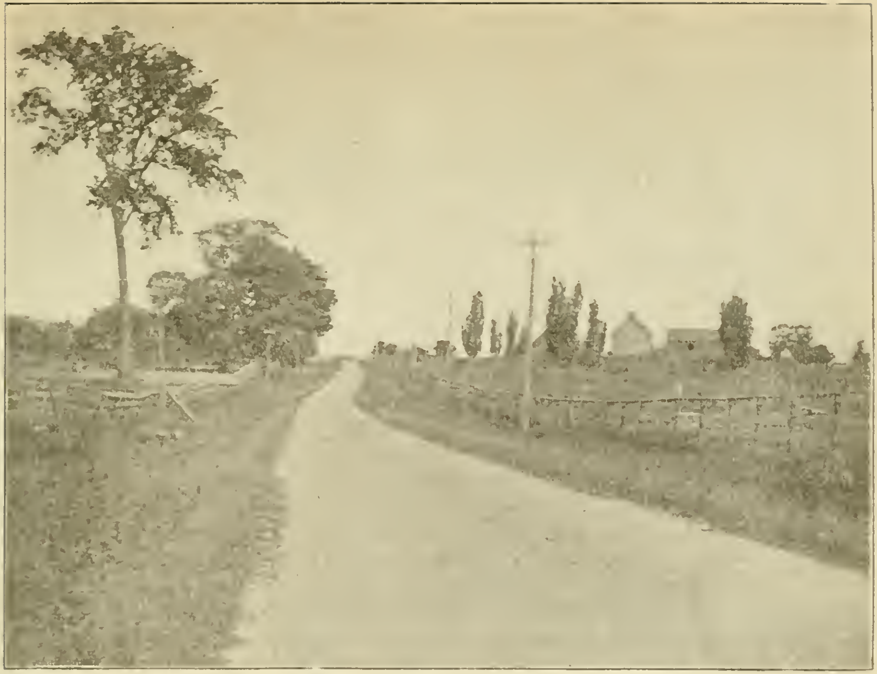
By A. W. Campbell, C.E., Toronto, Ont.

The good roads movement has, in Ontario, passed through a number of interesting stages. In spite of the fact that the first organizers were, in the main, farmers, business and professional men and journalists, it was first attacked on the score of being a fad of the bicyclists. A little later, as the bicycle became more and more generally recognized, not as a toy of a sportsman, but as a vehicle of practical utility, even among farmers, this ground became untenable. The opposition then settled into a defence of statute labor in its entirety, while road reform was described as an effort to impose a burdensome tax upon the farmer for the construction of expensively built stone roads. All this has almost gone by, and we find councils and people accepting more and more the principles of the movement, and everywhere efforts are being put forth to carry them into practical execution. There is everywhere a reasonable desire to give statute labor due credit for the great amount of good it has done; to accept it still where the local circumstances make it available as a means of securing better roads; but where the condition of the people has so advanced that statute labor is no longer a just, equitable and serviceable system of taxation, it should be abolished—as any other unjust tax. That is the feeling which is rapidly developing throughout Ontario to-day, one which, because of its reasonableness, it is useless to oppose or curb—we can only mould and direct it.

A century has gone by since the passing of the first statute labor law in Ontario. It was an Act of the first Parliament of Upper Canada, convened by Lord Simcoe, the first Lieutenant-Governor, at Newark—now Niagara-on the-Lake. This was in 1796. Less than ten years later England and Scotland repealed their statute labor law because of the excessively bad condition of the roads, substituting a system of better management and expenditure, which, under the methods of Macadam, Telford and McNeil have amply justified the change. Ontario still retains the system of statute labor, and has learned but few of the actual principles of road building from the men who worked so great a change in the roads of the mother land. The improvements which have been made to the roads of Ontario are by no means due wholly to statute labor. As a part of the first settlement duties, road allowances were cleared of trees and of stumps, sufficiently to form a wagon track. Through the Huron tract, the Canada Company spent large sums in opening up roads. The Governor's Road, from London to Toronto; the Kingston Road, along Lake Ontario, from Toronto to Kingston; the old stage road from Kingston to Montreal; the London and Hamilton Gravel Road; the Sunnidale Road; the Hurontario Road, Yonge Street; the road around the lake from Hamilton to Niagara; these and many other roads in different portions of the Province are examples of the effect which Government aid, toll road companies, and individual efforts, apart from statute labor, have had on the roads. In addition to this have been the annual large expenditures of money by county and township councils.

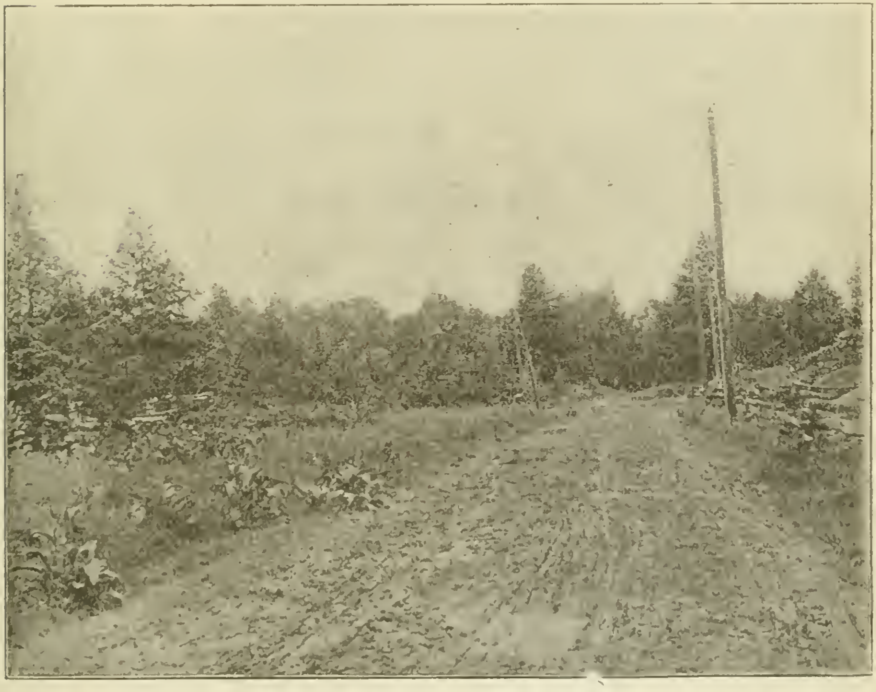
Statute labor will do a certain amount toward the making of roads. In the brave pioneer days of this country, it did much toward taking out stumps, grading, corduroying, and has since done considerable toward gravelling or covering with broken stone in certain sections. But past a certain point statute labor will not improve the roads. When the roads have reached this point, a backward trend is distinctly noticeable. They commence to deteriorate rather than improve. The incentive which actuates the pioneer who feels, desperately almost, the need of better communication with the market, the mill, his neighbor, has been lost. At this point statute labor commences to be performed in a perfunctory, shiftless, idle manner, becomes the farce that is rapidly condemning the system in all the older sections of the Province. It is at this juncture we turn to other countries for information as to the best course to pursue. In none of them do we find a system wholly applicable to Ontario, but our policy in this, as in other matters in which we hope to progress should be, to adopt that which is suitable to our conditions and surroundings, discarding that which is unsuitable.

A review of the systems used in countries which afford us models for road construction, indicates to us one great defect in our present methods. This is the inefficiency of oversight. In this respect our statute labor has become, not a system, so much as an entire absence of system. With any system, rightly so called, there must be centralized control. In France, certain of the roads are maintained by the Government of the Republic as national roads. The charge of these roads is deputed by the Government to the chief engineer, who in turn allots different departments to the different members of his staff. Other roads are managed very much as country roads; others, of least importance, would correspond much to our township roads. In all these, there is the one general principle—that of centralized control. On the roads of least importance the ratepayers may, if they so desire, work out their special road tax, but this work is done under the direction of a competent supervisor in whose charge the road is placed, and who is directly respon-ible for the condition and the proper outlay of money and labor upon them. In England, national roads do not exist, but county roads and parish roads do; the principle of centralized control again being displayed. So it also is in Germany. In Massachusetts, on this continent, we find the best models of road construction built by the state. They are built and maintained by centralized authority; large sums are being expended by the state, and it is expected that ultimately one-tenth of the road mileage will be built in this way. This system, it is expected, will serve two purposes. One is the construction, in a permanent and durable manner, of the leading highways of the state; the other that of educating the people of the state in the necessity of having good roads and the best manner of building them, so that the roads of lesser importance



EAST OF BROCKVILLE—"MADE GOOD YEARS AGO AND STILL GOOD."

[From Photo by F. E. Fairbairn, Brockville.]



WEST OF BROCKVILLE—"NEVER GOOD."

[From photo by F. E. Fairbairn, Brockville.]

under the control of township councils will be built in the best and most economica manner.

As has been emphasized in the preceding paragraph, the lesson to be learned from such examples as this, is not that we should adopt the system of France or England, or Germany or Massachusetts, but that we should adopt the principle of centralized contral. It is useless to say that we need not look to more experienced countries for models, by asserting that we cannot afford to build such roads as France, England, Germany and Massachusetts possess. There is no part of the Ontario Good Roads movement which advocates for this Province such expensive stone roads. But we, if our resources are less, must husband them more carefully, apply them more judiciously and skilfully, and for *this* we must seek the advice of older and more experienced countries.

There is no desire on the part of the road reformer to adopt revolutionary plans. It is rather by a process of development and growth that reform should be accomplished. How then, to apply the principle of centralized control to our present system is the first part of the problem to present itself. The trend of thought, as we find it in many parts of Ontario, affords a solution. County councils are taking over leading roads to build and maintain, and over these competent supervisors and foreman are being placed. The feeling adverse to statute labor is rapidly increasing; townships councils will find it necessary to abolish it, and over the township roads will be placed competent foremen and supervisors. However radical, to those who still have faith in statute labor, the ultimate outcome may seem, the process of reaching it will be one of development and growth, a gradual change. Statute labor will be less and less faithfully performed, the annual appropriations township councils will be compelled to increase, and statute labor will shrink to less and less, until extinct. It is merely a process of evolution, an instance of the survivial of the fittest. It vanished from England and Scotland nearly a century ago. In the older portions of Ontario it is slowly but surely passing into the age of fossilization.

Taxes always have been, probably always will be, unpopular One cause for this is that the reason for taxation is not asked; money paid in taxes is considered a direct loss, almost highway robbery, from which no return is received. The real spirit of a tax, however, is a united effort of citizens in obtaining some common necessity. Take for example, the money spent on roads. What would be the result if this tax were utterly abolished, no work done on the roads, no roads provided, and each man left to build a road to the market town for himself alone. The supposition is so impractical that it absurd. Under such circumstances we would quickly find farmers' clubbing together their money and work as they were mutually interested, until we would have practically a township corporation again formed and a tax established. It is the same with schools, the same with the administration of justice, construction of drains, etc. Taxes are a measure of economy, not extravagance. They are an unalterable example of the old adage, "in union is strength." While the principle of taxation thus commented on may seem to many too simple for consideration, it is an axiom few stop to consider, is frequently lost sight of, and taxation becomes unreasonably unpopular.

It is this unreasonable umpopularity that so frequently lends strength to the question "What will good roads cost us"? Does the same man refuse to build fences, a stable, a house, because of the cost? What would it cost him if he did not fence his farm? What would it cost if he allowed his horses and cattle to remain unprotected all winter instead of providing warm stabling? What would would it cost if he lived in a log cabin instead of a comfortable house? What are bad roads costing him?

When we commence to consider what bad roads are really costing us, the sum of it all becomes very difficult to comprehend. The cost of good roads can be stated in dollars and cents, but it is not so with bad roads. Bad roads are costing some citizens of Ontario half their lifetime in driving over them; in driving one mile it occupies the time that it would take to drive five, if the roads were good. They are costing many a farmer much of the self-respect he feels when driving along a good road at a good pace with clean buggy, clean harness and clean horse. They are costing our farmers small sums which soon aggregate large sums, in repairs to wagons, buggies, harness and whips. They are costing the privilege of attending the church and public meeting at many seasons of the year. They are costing the young people of the farmers a considerable part of their education, costing them the privileges of society every healthy mind demands. They are costing the rural districts a large share of their population which, in disgust at the stagnancy of farm life, drifts to the city, overflowing the professions and trades, and lessening the value of farm property. This and much more is the cost of bad roads. To doubt that the loss is much more is to forget that incurred by the business aspect of farming, by trade and commerce, by the railway and transportation systems by the manufacturing and dairying industries, all of which are both direct and indirect losers.

If, then, we centralize control by placing properly qualified supervisors over our roads, and if, in providing proper means to carry out the work under this supervision, it is found necessary to substitute for the cumbersome statute labor a special road tax, what are some of the plain practical improvements which would be made on the roads?—a plain practical question, requiring, however, a volume to fully answer. Carried out as it should be, and would be, for the citizens would demand it, the road machinery would be handled to better effect, work would be done at the most suitable season of the year or whenever repairs were demanded; improvements would be made by men accustomed to road work and therefore skilled; materials for roads—gravel, timber, etc.—could be chosen and prepared under one man to better advantage than as now; the work would be done with a view to permanency and the principles of roadmaking more closely followed.

The first principle applicable to all the roads in this Province is good drainage. "Take the water out and keep the water out" is a rule which must be followed in the making of every road. It is not enough to dig trenches at the side of the road and call them drains. These trenches must be real drains; that is, they must have a good fall to a clear outlet and be in every respect capable of carrying the water away. The road must be rounded up in the centre so as to shed the water quickly to the side drains There must be a track in the centre of the road on which travel can pass. This track must be hard and smooth so as to afford the least friction to travel, prevent ruts, and at the same time permit water to run off to the sides quickly. Ruts and holes must not be permitted to form but must be filled up as soon as they appear, The drainage must not be abandoned with taking care of the surface water, but in many instances must extend below the surface in the form of tile underdrains, so as to maintain a firm foundation and lessen the destructive action of frost—injurious only to wet and water soaked roads. In addition to the simple work on roads is greatly needed better methods with regard to bridge and culvert construction. The principles above enumerated with respect to roads require an infinity of special methods and treatments in arriving at the best results according as the land is high lying or low; is clay, sand, vegetable mould, etc; is difficult or easy of drainage; according to the extent of travel, the quality of road metal obtainable—these and many other varying conditions. That roadmaking and highway work of all kinds is considered a matter in which every man is proficient, is probably one of the evils underlying the evil of our bad roads to-day. In the application of a few simple fundamental principles lies the skill required in roadmaking as in other arts and sciences which are regarded as difficult. Roadmaking is an art, requiring much experience and skill.

Good roads bring prosperity, and prosperity brings good roads; they go hand-in-hand, each assisting the other. A recent writer has said that Spain has lost Cuba because the former country did not join the good roads movement. Far fetched as the assertion may seem, it contains the element of truth. Cuba, the richest and most fertile island of the Atlantic, is still in nearly every part traversed over the common highways only with the utmost difficulty. Barbaric Spain has not yet learned what Rome knew one thousand years ago, what England well knows to-day, that roads are the arteries of commerce along which flows the life stream of a nation, bearing success, civilization and contentment to the inhabitants. The value of good roads to a community, as to a nation, cannot be over estimated. Ontario wants good roads.

THE GOOD ROAD MOVEMENT.

By Major James Sheppard, Queenston, Ont.

It is very encouraging to the men who started the Good Road movement a few years ago to see the change in public sentiment that prevails to-day in comparison with the lack of interest taken in the subject when the agitation was first started, and to see the practical improvements that are being carried out in many municipalities in connecion with the highways. For many years there had been a few men in almost every municipality who were dissatisfied with the state of the roads and the waste and inefficiency of the statute labor system, but the great mass of the people were either indifferent or hostile to any change, fearing that improved highways meant increased taxation, or at least a change in or a more rigid enforcement of the statute labor law. If there was one privilege above another that the ordinary farmer valued, it was his right to work out his road tax as his father had done before him (that is, if he could not get out of it in any way); and the supposed honor of being pathmaster, showing his skill in roadmaking, and bossing his neighbors a few days in the year, these were privileges not lightly to be thrown away at the call of a few "cranks," as the men were termed who advocated an improved system and more intelligent roadmaking. To-day we find quite a different state of affairs prevail. It is the great mass of ratepayers that are demanding from the councils and pathmasters that the roads shall be improved; money is freely voted and extra work done cheerfully, but unfortunately the results obtained, in many cases, do not come up to the expectations of the public, and grumbling and disappointment follow.

The old idea that every man is a born roadmaker dies hard, and until that idea is got rid of we shall not have good roads, nor will the taxpayers get value for the money spent. Men are not born roadmakers any more than they are born doctors, or lawyers, or plowmen. Roadmaking is an art as much as any other branch of human affairs, and can only be attained by practice and study. True, some men have a natural ability along some lines, and we find a man now and then who has good ideas on roadmaking, but he is the exception, and is seldom found filing the position of pathmaster. If we wish to prove this statement, we have only to take a drive over our country roads in the month of June, when the road labor is being performed, and we will find that all kinds of ideas prevail and all kinds of roads being made—wide roads and narrow roads, roads hollow in the centre and roads heaped up so that you can hardly drive on them; all kinds of material being used, gravel, sand, blue clay, boulders, heaps of stone, sometimes covered but often left to roll around the road and be a nuisance; fifteen inch tile where six inch would do the work, and six inch where it would require twenty-four; big ditches dug down hill so the water may wash out a gully, for someone to fall into and collect damages from the council; and where the road is level, a wide flat ditch is provided, so that the water may lie along side the road bed and keep it soft for the horses' feet. And we find all kinds and conditions of men superintending the work—wise men and foolish men, industrious men and lazy men, young and old; all are born roadmakers, and we confiding taxpayers put our time and money in their hands and expect good roads to be the result of their efforts.

Then economy is a word to conjure by in municipal affairs, and in consequence, if a job is to be done a cheap man is hired, no supervision is exercised; none is required, any man can make a road. The result is that a good cause is injured, money wasted and disappointment and dissatisfaction follow. This is all wrong, and until we strike out on new lines we will never get the improved roads the public are demanding. Some councils are sending out circulars to their pathmasters, instructing them regarding their work; this is a move in the right direction, but it does not go far enough. Every municipality ought to have a plan of their roads drawn up by a skilled roadmaker, together with a report of the quantity and quality of material available for this purpose; also as to the bridges required and the best and cheapest way of building and caring for them, and the best system to adopt regarding width, crowning, and grading; then they would be in a position to instruct their pathmasters. And if this was followed up by appointing a superintendent who understood his work, and the roads and bridges put under his charge (something on the same plan as a city engineer manages the streets of a city), and then make it illegal for municipal councils to vote money to themselves to expend upon the roads, such an improvement would take place in a few years that we would be astonished we had stuck to the old system so long.

We do not want sentimental appeals for good roads; we want practical instruction in roadmaking. Mr. Campbell is doing good work, but he can only reach a few of the people interested, and cannot hope to instruct those who have, as one old gentleman told me last winter, "built roads before Campbell was born." It is hard to teach an old dog a new trick; it is the young men who have to be interested in the movement. Bulletins containing practical hints on roadmaking should be sent out every spring, and this should be kept up until the public recognize the fact that more is required in roadmaking than mere ability to hold a plow or scraper, or manage a road machine, and if money is to be expended by councils for road improvement, it is easier to vote it than to expend it, intelligently and usefully.

THE STATUTE LABOR QUESTION.

By M. M. Neilson, Appleton, Ont.

This question has been discussed a little at the Ramsay town hall on nomination day at the last two nominations, but nothing definite was arrived at, though it seemed to be the opinion of quite a number of farmers of the township that there should be some other plan adopted for making roads and keeping them in repair than by the statute labor system. Some thought that if fifty cents per day were collected for each day's labor assessed against the property, it would go farther in making and keeping roads in repair than the present system. Therefore the first question is, should the money be collected by the road overseers? (It will be needed about the first of June, so as to get the work done when the farmers are not too busy, as a great part of the work will have to be done by them.) Or should it be left until the fall, and collected with the other taxes? Second, should the present road divisions be kept intact, or should they be re-organized and put into larger divisions and have enough overseers to get the work done in a reasonable time. Third, how should the money be expended,—by giving out jobs by tender, or have the overseers get the work done by the day?

I will now proceed to offer a few suggestions on the foregoing questions. The first is as to the collecting the money which will be needed about June 1st, so as to get the work done when there is a chance to get men and horses to do it cheaper than at any other time in the summer. I think it might be collected by the overseers if the council would appoint responsible and competent men to fill that important office. These men could get a list of names from the township clerk with the amount of money to be collected from each person, and the overseers could produce vouchers to the council for all money expended by them; or it might be better for the council to borrow the money, if they have no funds on hand, and pay interest until it could be collected in the fall of the year, and let it be distributed so as to give each division all the road money collected therein.

Second, the township is divided into somewhere between forty and fifty road divisions, which I consider far too many to be worked successfully under a new system; but I think the township should be reorganized, divided into say seven or eight divisions, with one road overseer in each.

Third, how should the money be expended? Wherever practicable, I think jobs should be given out by tender, and let the overseer be particular in getting the work done according to contract; but other work such as is done by the grading machine will have to be done by the day.

INDIAN DEPARTMENT.

ADDRESSES DELIVERED BY INDIANS AT OHSWEKEN.

CHIEF A. S. SMITH: It gives me great pleasure to have an opportunity of saying a few words at this important meeting on the Six Nation reserve. I, however, desire to address myself more particularly to the gentlemen of the delegation to this institute meeting. You are doubtless aware of the fact that in olden times when your forefathers and my forefathers met together it was generally to hold a council of war and consider how best to defend their common country and vanquish their common enemy. Your forefathers generally sounded the call to arms, and called on their red brethern to sharpen their tomahawks and scalping-knives and to prepare for the fray, and your forefathers themselves got their muskets and swords in proper shape. You are still engaged in war, though the nature of that warfare is somewhat changed for the best, and the nature of the weapons more congenial. You still need your faithful allies, the Six Nation Indians. It is still your duty to call a council of war and consider how best to defend our common country and vanquish our common enemies, poverty indolence, negligence, ignorance and hap-hazard farming, and I am glad that you still consider it your duty to sound that call to arms and to urge your red brethren to arm themselves for the fray and still fight side by side with you. But I am glad and grateful above all that the weapons now needed are not swords and spears but ploughshares and pruning-hooks, and that you still retain your good opinion of the bravery of your red allies sufficiently so as to still demand their assistance in the present and more noble warfare, viz., that of making this Canada of ours one of the foremost countries in point of agricultural resources, and her people a prosperous, contented, peaceable and law abiding people.

CHIEF JOSIAH HILL, secretary of the Six Nation Council was called to speak in the Farmers' Institute meeting held at Oshweken, and when he got to the platform he said: Mr. Chairman, ladies and gentlemen: I am sorry that I feel to be my duty to speak short and to speak in the Indian language for the benefit of those who are here and not able to understand fully what has been said by the speakers who used the English language. I will, however, advise one and all to try and store up what you hear and to try to practice what you understood from these gentlemen in the various branches of farming industry, and urge strongly upon the Indians to raise more sheep and less dogs, since they heard from the chairman of this meeting that plenty of bells in a flock of sheep is a protection from dogs. We are told that it would take about five hundred cows well taken care of to start a cheese factory and to make it pay, within the limit or radius of about three miles from the cheese factory each way. I think it becomes our duty, occupying this reserve as we do, to raise more cows and take care of them as we ought, and as soon as possible start one cheese factory anyway. I am sure that the council of chiefs and the Department of Indian Affairs will give us a hearty co-operation in this undertaking if necessary. As it is, we have one building which I think is well adapted to turn into a cheese factory. We have any amount of pasture land and good water upon this reserve. If we could only have more barns and stables, I think we could start a good cheese factory in a very short time from date, and we would be all right. These gentlemen also told us how to raise fodder for these cows, and how to take care of them. You want to keep that in mind, and put it in practice when the season comes, and in that way you will derive immense value from this meeting. We also heard how to plant fruit trees and berries of all kinds. We ought to take advantage of this as well, as we have plenty of room for that kind of industry on this reserve. If we do not practice what we learn from these gentlemen, we will not profit anything from this meeting. I therefore hope that everyone of you will try and remember what we have heard, and practice it on your farms.

ABRIDGED REPORTS

FROM

EUROPEAN AND AMERICAN EXPERIMENT STATIONS.

EUROPEAN EXPERIMENTS.

DAIRYING.

A New Method of Making Butter. A patent has been taken out in France for a new method of making butter. In this process the cream is subjected to lactic acid fermentation until the fat globules are inclosed in a sufficiently strong covering of casein, when the cream is heated, carbonic acid introduced into it without sufficient agitation to churn the cream, and it is finally submitted to alcoholic fermentation. This fermentation changes the character of the cream, allowing the fat globules to rise to the surface, while the other ingredients remain behind. Churning in the ordinary sense is said to be unnecessary, as the butter-fat collects on the surface, and it is only necessary to wash it to free it from small particles of casein adhering to it.

Frozen Milk. The *Journal d'Agriculture* states that Casse's system of shipping milk in a frozen state has been adopted by the Danish Dairy Company, which has an establishment 100 miles from Copenhagen, capable of handling 30,000 liters of milk daily. From one fourth to one-third of the whole amount of milk is frozen artificially in cakes of about twelve kg. in weight and placed in large cans of about 500 liters capacity. The following morning the cans are filled with fresh milk and are then closed air tight and sent to Copenhagen. They can be kept in this way for several weeks, being opened for consumption at will. When it is desired to use the milk it is thawed by placing the contents of the cans in vessels surrounded by hot water coils. This thaws the milk gradually and creates currents in it which which will prevent any of the constituents separating out. A can which has been filled in June 17th was opened in Paris on June 25th. The milk tasted and had all the characteristics of pure, fresh milk. For some reason, however, the keeping quality of the butter made from the cream was unsatisfactory.

The Cleaning of Milk. The important question of the removal of dirt from milk has been attracting the attention of German experimenters. In the *Milch Zeitung*, Backhaus gives the results of numerous experiments in this direction. He found that the germs contained in the milk were, practically, in proportion to the amount of dirt found therein. As about one-half of fresh cow dung dissolves in milk it is impossible to estimate the amount present in the milk by the amount of dirt contained in it. In order to determine this, Backhaus recommends allowing the milk to settle and then filter it through glass wool. Sieves and strainers were found unsatisfactory for cleaning milk, but cleaning by centrifuge proved satisfactory from a mechanical and bacteriological standpoint, the bacteria, for the most part, passing into the separator slime. The germ content of the milk examined ranged from 302,000,000 per gram in ordinary milk to 1,013,000,000 in dirty milk. The cream showed a higher number of bacteria than the skim milk. There was found a disadvantage, however, in cleaning by centrifuge, in that, apart from being troublesome, the milk thus treated does not throw up as much cream as milk otherwise handled, which causes customers to regard it as being poorer in fat. The author of the article did not find filtering through paper or filter presses satisfactory. Filtering through sand removed the dirt but not the bacteria. Filtering through cellulose was successful from both a mechanical and bacteriological standpoint. In conclusion he says: "The fact that the impurities of milk are largely dissolved, and that the undissolved portion is removed either imperfectly or with great difficulty by any means at present available, shows the need of making every effort to reduce the impurities by careful milking and treatment."

Experiments with Pure Cultures for Ripening Cream. In the *Milch Zeitung*, P. Vieth reports on a number of experiments made at different seasons of the year with Witte's and Von Lorentz's cultures. The butter was kept for two or three months and then tested as to quality. As a rule, the butter made with the Witte cultures was better than that made without, as it changed less in keeping. There was no apparent good effect on the butter from using the Von Lorentz cultures as compared with butter from cream untreated with cultures. This bears out the results of previous experiments by the same author that there is no great improvement in the quality or keeping qualities of butter as the result of using pure cultures. They are generally used in creameries in order to remedy some fault in the butter. He intimates that the difficulty might frequently be avoided or remedied by scrupulous cleanliness and lowering of the temperature of the creameries.

MILKING TWICE AND FOUR TIMES A DAY. Backhaus, in the *Milch Zeitung*, reports a short experiment conducted with eight cows, the result of which was as follows:

The cows were milked twice a day from June 21st to the 24th, and gave a total yield of milk, 524.60, of fat, 17.04, of solids not fat, 45.47, the average composition of the milk being, fat, 3.25 per cent., solids not fat, 8.67 per cent. From June 28th to the 31st these cows were milked four times a day with the following result: Milk, 576.70, fat, 17.95, solids not fat, 49.57, the average composition of the milk being, fat, 3.11 per cent., solids not fat, 8.60 per cent. The percentage of increase from milking four times a day was thus: milk, 9.93 fat, 5.34, solids not fat, 9.01 per cent.

Milking four times a day thus gave a larger yield of both milk and fat than milking twice a day, but, contrary to the usual rule, the milk was poorer in quality. To test this further, the experiment of milking four times a day was continued, the cows receiving a richer ration. On an average, the eight cows showed an increase of 5.36 per cent. in the yield of fat, but only 0.44 per cent. increase in the yield of milk, and 0.65 per cent. in the yields of solids not fat over milking twice a day. It was further found that, when the time between milkings was divided equally, the milk did not have the same composition, the milk being poorer in fat after the cows had been at rest, as at night, while, after they had been in active motion, as feeding, the fat was higher. This is said to agree with the results obtained where cows are worked.

FEEDING MOLASSES PREPARATIONS TO DAIRY COWS. An experiment of considerable length was carried on in 1896 in Germany, to study the effect on milk secretion of molasses-peat feed (80 per cent. molasses and 20 per cent. peat), liquid molasses, molasses, and palm-nut meal, molasses pulp (a dried mixture of potato-pulp residue and molasses) and molasses chips (a dried mixture of molasses and sugar beet diffusions residue) in comparison with barley-meal. A constant ration of hay, straw and beets was fed. The experiment started with eight cows, of which two had to be dropped out on account of digestive disturbances, and covered seven periods, usually of twenty day's duration, only the last five days of each period being considered in making the averages.

The results were unmistakably in favor of the barley meal for milk production both at the beginning and close of the test. The different preparations of molasses were, as a rule, readily eaten, except the molasses pulp, which the cows did not seem to relish and of which they would eat only about half as much as of the other preparations. The molasses did not agree well with some of the cows. Only of the liquid molasses was the whole quantity given eaten. The molasses fed, however, seemed to favor an increase in the percentage of fat and total solids in the milk. The butter made during the feeding of molasses was in every way equal to that made when barley meal was fed, and no difference was observed in the churning or taste of the butter or milk. A further comparison of molasses with cane sugar showed a considerable superiority in favor of the former, both for milk and fat production.

In connection with these tests, the suitability of molasses as a food for cows in calf was also tried. Two cows in the last months of gestation were fed eight kg. of molasses daily, per 1,000 kg. live weight, and after calving the feeding was continued. There was apparently no injurious effect from its use either in the condition of the cow or the development of the calf.

FEEDING FAT INTO MILK. The *Milch Zeitung* (Germany) gives an account of an experiment in which palm cake and rich cocoanut were fed, the object being to increase the percent of fat in the milk. Where a very rich cocoanut cake was fed there was an increase in the yield of fat, but it was accompanied by a decrease in the yield of milk which more than counterbalanced the increase in the yield of fat. The conclusion arrived at was that there was no advantage from feeding the richer ration.

The *Milch Zeitung* also gives an account of an interesting experiment along the same line at the Agricultural Academy at Pappilsdorf. To a basal ration of hay, straw, malt sprouts, beets and grain, first linseed oil, then flax seed was added to try to increase the per cent. of butter fat. The linseed oil caused a falling off in the appetites of all the cows, and they refused to eat the basal ration up clean. While on the linseed oil, the cows shrank in milk yield. The milk yield increased when the flaxseed was fed. The results were considered entirely negative. The oil did not cause any noticeable increase in the fat content and it acted unfavorably upon the digestion, milk yield, and general condition of the cows.

Perhaps the best authorities upon this question of the effect of food upon the quality of milk are the Danes, whose feeding experiments have led them to adopt the following conclusion: In the comparative feeding experiments with milch cows now continued during nine consecutive years, in which about 2,500 cows, divided into 218 lots on twelve estates in different parts of our country have been included, it has constantly been found that the changes made in the system of feeding the different lots have been practically without effect upon the chemical composition of the milk. In these experiments, barley and oats have been fed against roots, oil-cakes, wheat bran, wheat and molasses feed; mixed grains and oil cakes have been fed against roots, and grain and roots have been fed in addition to the regular rations given.

FIELD CROPS.

POTATO SILAGE. A number of French experiments have been carried on to ascertain whether the heat due to fermentation in silos could be utilized for cooking and preserving potatoes. The potatoes were buried in a silo filled with crimson clover. They acquired the color of the plant and the odor developed in fermentation. They were flattened by the heavy pressure and when removed were comparatively soft. When they were examined microscopically and chemically, it was found they had been cooked by the heat and rendered more digestive.

That a temperature of about 160 degrees F. is necessary to cook potatoes in a silo is shown by another French experiment to see whether corn could be preserved in a silo without cutting it up. A silo was filled by surrounding a ton of potatoes with corn. When opened the corn and potatoes were both found in good condition. The tubers were somewhat flattened, but more cohesive than in the previous experiment, while they were not so much cooked. The reason given was that the large size of the stalks and cobs of the corn diminished the pressure, and consequently, the temperature. Chemical analysis showed that potatoes ensiled with the crimson clover lost less water than those with the corn. The most striking difference, however, was the increased assimilability of the potatoes ensiled with the clover. Girard believes that under similar conditions of temperature, pressure, and moisture the same results would have been obtained by ensiling potatoes with clover and with corn. When the crushed potatoes were removed from the silo they lost weight very rapidly, and formed a hard mass containing only 15 to 20 per cent. of water. In this condition they could be kept for a long time. When required for feeding they were soaked in water, which they readily absorbed, and thus regained their softness and digestibility.

Courmouls-Houlès ensiled chopped raw potatoes, with about 2 lbs. of salt per 1,000 lbs. of potatoes, under a pressure of 2,500 lbs. per square yard. The total cost of washing, chopping, putting in the silo and weighing fifty tons of potatoes was about $15. When the silo was filled the silage was 5½ feet deep. Sixty-two days later it had sunk to about three feet. The temperature of the silo when filled was 39 degrees F. and when opened 50 degrees F. The ensiled potato pulp was white, but became blackened on exposure to the air. Cattle eat this pulp greedily alone or mixed with cotton-seed cake.

In another experiment with the beet roots and potatoes ensiled and surrounded by corn, it was found that the appearance of the beets and potatoes was unchanged. The potatoes were somewhat soft as if they had been boiled in water. Ensiling them seemed to have caused a loss of water without really cooking them. About two-thirds of the sugar of the beets was lost by ensiling them.

SOIL INOCULATION FOR LEGUMINOUS PLANTS. The power of the leguminous plants, such as clovers, peas, vetches, etc, to draw on the vast stores of oxygen in the air by means of the bacteria which live in the tubercles on their roots is well known to all intelligent agriculturists. In soils abundantly supplied with nitrogen there is little need for the bacteria to be present, and the tubercles which they produce are not likely to occur on the roots in such soils. In soils poor in nitrogen, however, the bacteria, if present in sufficient quantity, attach themselves to the roots in large numbers and stimulate the plant on which they grow to produce the tubercles and provide the necessary nutritive substance for the growth of the bacteria, while, in return, the plant receives the nitrogen which the bacteria alone can take from the air and render available for use by the plant. In this way, even in soils poor in nitrogen, a sufficient amount of this element is obtained to build up the nitrogenous substances in which leguminous plants are so rich.

It was often noted, however, that when a leguminous plant was grown for the first time on a soil it frequently produced no tubercles and failed to thrive, even though some other leguminous plant had been successfully grown on the same soil the previous year. This led to the conclusion that each leguminous plant has its own kind of bacteria, and is not likely to thrive unless these peculiar becteria are present in the soil, a conclusion confirmed by investigations in Europe and on this continent.

The next step was to find means of inoculating the soil with the desired bacteria. The first method adopted was to spread over the field soil taken from a field where the desired crop had been successfully grown. This method, however, was cumbersome and not always reliable.

Two German investigators, Nobbe and Hiltner tried the preparation of pure cultures of the specific organism which acted favorably in the case of each leguminous crop, and raised these successfully for soil innoculation. These cultures are sold on a commercial scale in Germany under the name of Nitragin, there being cultures for peas, beans, vetches, lupines, clovers, serradella, flat peas and melilotus.

Two methods of using the nitragin are followed : (1) Inoculation of the seed direct by bringing it, by means of water, into contact with the nitragin, and (2) inoculation with the nitragin of some of the soil of the field on which the crop is to be grown, and then spreading this soil over the field and working it in to a depth of about three inches. The cost of inoculation is estimated at about $1.25 per acre. At the Alabama Station, however, the cost was $2.20 per acre. This subject is still in the experimental stage.

HOW LONG DO NITROGENOUS SALTS INFLUENCE THE YIELD OF WHEAT AND BARLEY. Investigations at the Woburn Experimental Farm, England, into the important question as to how long the application of nitrogenous salts, like sulphate of ammonia and nitrate of soda, will continue to act beneficially upon the crops of wheat and barley show conclusively that, as regards wheat, top-dressings of nitrogenous salts cannot be considered as lasting beyond the year of their actual application. With barley there was a small amount of the salt left available for the next year's crop.

The investigations have been carried on since 1882. Two plots, which had previously been receiving, respectively, double dressings of ammonia salts and nitrate of soda, together with mineral manures, were subdivided, the top dressings being continued on half of each plot, but omitted on the other halves. Every alternate year since the plots which had no top dressings the previous year were top-dressed, and those top dressed the previous year were left without top-dressing. The general results from 1882-96 were as follows:

	Ammonia Salts. Bushels Wheat.	Nit. of Soda. Bushels Wheat.
When salts are applied every other year..........	37.2	34.0
" " " omitted " " "	23.1	16.4

In the case of the barley the produce did not fall off nearly so much as the wheat when the top dressings were ommitted.

Some general conclusions reached from the experiments carried on at this Farm are as follows:

It is useless to apply mineral manures alone for either wheat or barley. Nitrogenous salts have a great influence on both the wheat and barley crop, especially barley, but it is not good to use them alone, for the crops are not healthy, and the result of the continuous application of the salts is to deprive the soil of its mineral ingredients, more particularly the lime. This exhaustion is experienced sooner with barley than with wheat, and sooner with ammonia salts than with nitrate of soda.

The proper manuring for wheat and barley is the application of mineral manures along with moderate amounts of nitrogenous manures. As a rule, 2 cwt. of sulphate of ammonia, or 2¼ cwt. of nitrate of soda per acre, is quite sufficient to use in conjunction with mineral manures. More than this is wasteful and harms the crop.

In a dry season nitrate of soda is best, and in a wet season sulphate of ammonia, the former leaching through the soil faster in wet weather. It produces the more straw, however.

POTATO DISEASE. Every year since 1892 experiments have been carried on at the Woburn Experimental Farm, England, into the spraying of the potato crop with Bouillie Bordelaise—a mixture of sulphate of copper, lime and water in the following proportions:

Sulphate of copper	20 lbs.
Lime..........................	10 "
Water	100 gallons.

The results of these investigations has been to prove clearly that the use of this mixture is a considerable check to the disease, and, even when no disease appears, the sprayed crops gives a heavier yield than the unsprayed one. The sprayed portion of the crop also remained green longer than the unsprayed part, the prolonged growth resulting in the heavier yield.

FINGER AND TOE IN TURNIPS. The prevalence of finger and toe in turnips sown on a portion of the Woburn Farm in 1895 was so excessive that scarcely a single root was left. It was, therefore, decided to set apart a portion of the ground and test the effect of different applications as a remedy for the disease. In order to make sure that the land should be infected, a strip was further inoculated by spreading on it some of the diseased roots of the 1895 crop.

Lime, gas lime, and basic slag were applied some months before the crop was sown in 1896, the other applications were made just before sowing. The results were not very conclusive as to the comparative merits of the different applications as preventatives of the disease owing to the fact that hares and rabbits destroyed a good deal of the crop, but, apparently the plot with the largest number of sound roots was the one on which four tons of gas lime per acre had been used, the next was that with the basic slag, and after that the kainit plot. Two tons of gas lime per acre did good, and the two limed plots were also fair, four tons of lime proving more effectual than two tons per acre. Sulphate of copper, sulphate of iron, caustic soda, bleaching powder, and common salt were, apparently, ineffective. On the strip inoculated by diseased roots the inoculation was so thorough that the new roots were almost entirely destroyed. The only portions of this strip that had any sound roots on it were the plot on which were applied four tons of gas lime, and the kainit plot.

ORCHARDS.

Effect on Young Apple Trees of Keeping an Orchard in Grass During a Dry Season. The first Report of the Woburn Experimental Fruit Farm, England, contains some striking results of the very common practice in that country of keeping orchards in grass for long periods.

The reduction in the size of leaves of young apple trees thus grown was 35 per cent. for dwarfs trees, and 41 per cent. for standards as compared with trees in cultivated ground, the loss of wood growth being 87 per cent. for dwarfs and 74 per cent. for standards; in the case of the dwarf trees, too, there was a reduction of 71 per cent. in the weight of the fruit crop. The ill effect of grass round the trees was much greater than that of weeds. The report states, however, that in a year of greater rain fall the ill effects of both grass and weeds would probably, be considerably less than in the dry seasons in which these investigations were held.

Distribution of Alcoholic Ferments in Nature. It has long been known that the yeast plant is found upon the grape and other fruits containing sugar, and that it is from the skin of these fruits that the yeast enters into the juice when the fruit is crushed, and brings about the fermentation therein which results in the production of alcohol.

It has also been discovered that the yeast-plant can be found in the soil during a portion of the year, but hitherto it was not known how the yeast got on to the fruit, Some light has been thrown on this subject by some recent investigations made by an Italian, Amedeo Berlese. He found several varieties of yeast in the soil from April to June; in the vineyards they were traced to a depth of four inches, and in the woods as far down as twelve inches. In June they were rarely found in the soil of the vineyard, and in July they had quite disappeared. One variety was, up to June, found distributed equally in the soil, in both sunny and shady places; but, later on, where the soil was exposed to direct sunlight, it gradually disappeared. Numerous yeast cells were found on the thick and tough bark of oak and olive trees, the kind of tree and the distance from vineyards being, apparently, immaterial as regards the number found. Some yeasts were most numerous on the shady side, others on the sunny side of the tree, the former being, apparently, the best varieties for wine production. No alcoholic ferments were discoverable on the grapes until June, nor were any found in the atmosphere during April and June.

The investigations showed conclusively that the yeasts are carried to the grapes by flies, ants, and other insects, which resort to the grape for the sugar which it contains. Among these insects the most important in this work, is the cellar fly or gnat (Drosophila cellaris.) The alcoholic ferments are consumed by insects (especially the two-winged ones, such as flies) in their food, and pass in a living state through the digestive organs of these insects, without suffering any injury; in fact they increase rapidly in the intestines of the insects, if the temperature and food are suitable, and are deposited by the insects upon grapes and elsewhere. The author believes that some of the ferments actually exist through the winter in the bodies of insects.

VETERINARY.

Horses Poisoned by being Fed Spoiled Potatoes. The Journal of the Royal Agricultural Society of England records an instance of no less than eleven farm horses dying within the space of three days from the effects of being fed spoiled potatoes.

The first animal, a Clydesdale stallion, was taken ill while plowing. In the morning it appeared very lively, but about ten o'clock it fell down, as in a fit. It was able to get near home, although it fell down twice, but just outside the yard gate it fell again and could not rise, death taking place about one o'clock. The same afternoon a gelding showed the same symptoms and died within two hours. On the following morning an aged mare died, and two other young horses showed symptoms. A fourth animal was shortly afterwards taken ill, and all these four died within four hours. The others died the next day and the day after, the last one to die having been ill for twenty-four hours. Except in the Clydesdale stallion, which fell down in a fit, the first symptom noticed in all the animals was weakness and loss of power over the limbs. The animals lay or fell down and were unable to get up ; while lying down some attempted to eat a few mouthfuls and there was no struggling or evidence of pain. Towards the last there appeared to be a difficulty in swallowing, and a "fluttering" was noticed in the chest. A post mortem examination showed that all the organs were healthy except the large intestine, the mucous membrane of which was slightly irritated. The diet of the horses consisted of steamed potatoes, boiled barley, beans, and wheat chaff. The quality of the barley, beans and chaff was excellent, but the potatoes were old and many of them mouldy and much decayed. They had been stored in sacks, but were not sprouted to any extent. Some of the horses had been fed on them for ten or twelve days and others for only three or four days. The horses were kept in two stables some distance apart. In one stable all the horses died, in the other five out of the nine horses died while four were unaffected. Three o these latter got no potatoes, while the fourth, through remaining in the yard with three of those who died, was "bossed" by them and kept away from the manger containing the potatoes.

In order to ascertain whether the potatoes were the real cause of death, a quantity of them were sent to the Royal Veterinary College, and fed to an old cab horse. Great difficulty was found in getting him to eat them, but by keeping him short of other food, he was induced to eat nearly two bushels in nine days. On the ninth day he was found down in his box and unable to get up without assistance. On the same day he fell again and could not get up. Death took place quietly thirty-six hours later.

An examination showed that the stomach was healthy, but there were patches of inflammation in the small intestine and one of the large intestines (double colon) was inflamed almost throughout and of a livid tint. A small patch of pneumonia was present in the left lung.

A second experiment at the farm with a cart horse resulted in the samemanner, the animal on the tenth day being unable to rise and dying quietly on the following day. The postmortem examination revealed inflammation of the lining membrane of the large intestine. A chemical analysis proved the absence of any mineral poison, and the steaming of the potatoes precluded all risk of infection from organisms. It is, therefore, probable that the poison was some organic substance generated by the bacteria which were growing in the decaying potatoes.

It should be stated that the quantity of potatoes consumed by each of the horses that died varied considerably. Some had two buckets a day for ten or twelve days, others only half a gallon a day for three or four days. This would appear to show that the poisonous substance was not equally distributed throughout the mass, and was probably confined to one or two sacks.

Parasites of the Lungs of Sheep. In an article on parasites of the lungs of sheep by G. T. Brown, in the Journal of the R. A. S. E., the writer sums up the points, in the, as yet, obscure life history of the thread worm, Strongylus filaria, as far as the latest investigations have brought them to light.

It appears that eggs containing living embryos, and embryos which have got free from the eggs, are expelled from the bronchial tubes of infested sheep in enormous numbers. It is also established that the adult worms have only a temporary residence in the lungs, but whether they are expelled living or dead has not been ascertained with certainity ; nor is it known what becomes of them when they quit the lung tubes. The embryos, it has been proved, live for months in wet earth ; they may be dried by the heat of the sun without being destroyed ; nor does the frost do them any serious damage. In common with the other form of strongylus, they are swallowed by earth worms and again ejected after having gone through certain changes, but, with the evidence obtained from the examination of many hundreds of earth worms, it is impossible to believe that even a considerable number of the embryos which are expelled from the sheep's lungs are disposed of in this way. It is not unlikely however, that a large number become parasitic to certain plants, and in that position acquire a sufficient development to fit them for residence in a warm-blooded animal.

LOUPING ILL. Principal Williams has been continuing investigations into the cause of the disease in sheep called Louping Ill. The results, which he gives in the Highland and Agricultural Society of Scotland's report for 1897 confirms his previous conclusions that, unless ticks are present, there will be no Louping Ill. In Skye, where it seems there are two broods of ticks, there are two outbreaks of the disease, one in the spring and the other in the autumn. Occasional cases of the disease may be observed during summer and autumn even in the south, but these are exceptional and due to late broods.

The following are his recommendations for the extirpation of the disease :

(1) The burning off or eating down by the cattle of all old and rough grasses which harbor ticks.

(2) The improvement of the land by dressings of common salt, lime, or both combined, or some cheap phosphatic manure such as basic slag.

(3) When the weather admits, to dip the sheep in a carbolic preparation ; if this is impossible, to pasture the sheep on clean lands during the tick season.

(4) To remove the lamb, when a ewe with a lamb by her side is seized with the disease, as cultivations from such ewe's milk have revealed the organism in various stages.

IMMUNITY FROM DISEASE CONFERRED BY BLEEDING. A Russian physiologist, Essipov, who has studied the effect of copious bleeding on the chemical composition and on the properties of the blood, has reached the conclusion that when rabbits, guinea fowl, and pigeons are bled at the rate of 1-35 to 1-40 of the weight of the body, the blood of the animals acquire properties fatal to bacteria, which are especially characteristic in the case of the cholera germ. The immunity becomes gradually established, reaching its maximum in about twenty-four hours. Then it decreases. Not only does the blood fail to form a culture medium for the bacteria, but the entire animal becomes, for a time, immune, even inoculations failing to inoculate. The immunity is more pronounced in cases of frequent bleeding,

AMERICAN EXPERIMENTS.

DAIRYING.

Good *Versus* Poor Cows. The importance of keeping none but the very best cows cannot be too strongly urged upon dairymen and farmers. A study of the amounts paid the patrons of any cheese factory will soon convince one that there is a very great difference between the amount paid for the best cow's milk and that paid for the milk of the poorest cow. The difference in the profits from keeping good, medium and poor cows has been very well illustrated by the experiment stations in the records of their herds.

The record of the dairy herd of fifteen cows at the Utah station shows that the food cost of 100 pounds of milk varied with the different cows from 29.48 to 52.07 cents. The cost of food per pound of butter had a wide range. It was from 5.91 to 11.8 cents per pound. With butter at twenty cents a pound, the net profit per cow ranged all the way from $14.71 to $51.37 for the year. The cows had been selected with considerable care from common natives and grade stock.

Nine cows, mostly Jersey and grade Guernseys, at the Pennsylvania station, were fed in an experiment lasting 150 days. During that time there was a difference of $33.10 in the profit from the poorest and the best cow. The value of the product from the best cow was $64.32, while that from the poorest cow was worth only $28.06. The profit from the best cow was $37.65, and only $4.55 from the poorest cow. The cost of the food was very nearly as much as for the best cow. This is the point so often overlooked.

At the New Jersey station the cost of keeping a cow for the year was $42.34, being the average for a herd of twenty-one cows. Valuing the milk at one cent a pound, the best cow cleared a profit of $40.69, and the poorest one only $1.79. The best cow had the ability to take practically the same food and make out of it a product worth $38.90 more than the poorest cow could. Valuing the product as butter at twenty cents a pound, the best cow made a profit of $38.74 over the cost of her feed, and the poorest cow made a loss of $1.91. In this case the poorest cow did not pay for her keep. The best cow had the ability to convert out of the same food value a product valued at $40.65 more than the poorest cow.

Such facts should convince every farmer that it is to his interest to test his cows and find out definitely which cows in his herd are profitable ones to keep.

Rations for Dairy Cows: Wide *Versus* Narrow Rations. The Pennsylvania station made inquiries among the dairymen in that state as to the ration they were feeding their cows. The replies show that only about twenty-five per cent. of the rations were compounded in a practical and scientific manner. The largest ration reported contained four times the amount of food found in the smallest one. It seems impossible that of two cows of equal weight one could eat four times as much as the other. Making some allowance for difference in appetite, it would seem that in the one case the cows were over-fed and in the other case they were under-fed. Both conditions mean a loss to the owners.

As a rule the rations reported do not contain enough protein, i. e., nitrogenous substances. Bulletin No. 104 of the Ontario Agricultural College, on "Rations for Dairy Cows," show that Ontario dairymen are inclined to err in the same way. That is, they are not feeding enough of such foods as clover hay, peas, bran, linseed meal, cotton-seed meal, gluten meal, brewers' grains and malt sprouts.

The amount of protein required to properly balance a ration has been determined by numerous experiments, both in America and Europe. The proportion of protein to the other constituents of the food is called the "nutritive ratio." If the ration contains a large amount of protein it is called a "narrow ration," while if it contains a small amount of protein it is said to be a "wide ration."

The Pennsylvania station tried the effect of wide and narrow rations with the station dairy herd. The cows used were nine Guernseys and Guernsey grades about sixty days from calving. The permanent portion of the ration was corn stover and chopped wheat. To this different amounts of gluten meal were added, so as to make rations possessing nutritive ratios ranging from 1:3.9 to 1:6 7. The American standard for dairy cows calls for a nutritive ratio of 1:5. In the trial seven of the nine cows required less digestible food to make a pound of butter when they were fed the rations rich in protein. After deducting the cost of the food the rations rich in protein gain a little larger net profit. With the richer rations the percentage of fat was better maintained in the milk and even slightly increased.

The Massachusetts station has made two experiments to find out the effect of narrow and wide rations on the quantity and cost of milk and butter and the composition of milk. The basal ration fed the cows in the first experiment consisted of hay and sugar beets. In addition to these, wheat bran and Chicago gluten meal were added in such quantities as to make the nutritive ratio 1:3 86. Another ration was made up with corn meal instead of gluten meal, having a nutritive ratio of 1:9.43.

The results of the experiments show that the narrow rations produced from 11.8 to 18.9 per cent more milk than did the wide rations, and that they reduced the cost of production from five to twelve per cent.

On the narrow rations the cows produced 13.7 per cent. more butter in the first and 8.3 per cent. more in the second experiment than they did on the wide rations. The cost of food per pound of butter produced was ten per cent. less per pound from the narrow ration in the first experiment, but only 1 67 per cent. in the second one.

While the so called narrow rations as used in these experiments were extreme ones, it might be said that narrow rations which contain from two to two and a half pounds of digestible protein in a day's feed, aside from causing a ten per cent. increase in the milk yield, furnish in addition a manure from ten to possibly fifteen per cent. more valuable than do wide rations. There is no doubt that the narrow rations produce more milk and butter than the wide ones, and that by increasing the proportion of protein in the food up to a certain limit the fat content of the milk may also be increased. The market price of the foods fed, however, will be the controlling feature in actual practice as to how far a narrower ration than that of the feeding standard can be profitably used. There can be no doubt that many dairymen would feed more economically if they paid more attention to the balancing of their rations. The store of feed on the farm is generally lacking in nitrogenous substances, and consequently too often the ration for dairy cows is also lacking in the necessary amount of protein to enable the cows to produce as much milk and butter as they are capable of doing.

FEEDING FAT INTO MILK. Quite a large number of successful feeders believe that they can increase the percentage of fat in milk by feeding certain kinds of feeds, especially by increasing the percentage of fat in the food The Cornell Station in an experiment in which varying quantities of tallow were fed found no increase in the percent of butter fat. A similar experiment in Germany showed that feeding tallow to milch cows did not increase the percentage of butter fat. The fat content was increased slightly during the first week or two, but disappeared latter.

EFFECT OF PERIOD OF LACTATION ON MILK AND QUALITY OF BUTTER. During the winter of 1897 the Iowa Station completed their third experiment into the question of the effect on the production of milk and the quality of butter exercised by the length of time a cow had been in milk. Four cows which had been milked for sixty-two days from calving were chosen to represent fresh cows, while the strippers, which had been bred for six and a half months, on an average, were seven in number. Both lots of cows were fed the same quantity of rations. To each cow was given daily: sheaf oats, 8 lbs.; clover hay, 6 lbs.; corn, 6 lbs.; barley meal, 3 lbs.; sugar beets, 5 lbs. The test was a six days one, and the total amount of milk given by the fresh cows, separated, was 972 lbs; by the strippers 886 lbs.

The results from this experiment coincide with those of the two former ones conducted by the same station, that the period of lactation has no direct influence on the flavor of butter. Similar experiments conducted by Prof. Dean at the Guelph Station and by Prof. Kent, of Corvallis Station, Oregon, bear out the same view.

As regards the milk flow and the percentage of butter fat in cows of different periods of lactation, the New Jersey Station finds that, although individual animals vary greatly, in the first five months the decrease in the total milk flow from month to month is proportionately greater than the decrease in the total fat, and hence the average percentage of fat in the milk gradually increases, so that in the fifth month it is 0.5 greater than the average percentage in the first month. For the remaining three months the decrease in milk yield and in total fat was relatively the same. The influence of the period of lactation upon the composition of milk, while varying with individual animals, is, therefore, practically limited to the first five months.

The difficulty so frequently experienced by dairymen when churning cream raised by the gravity system from cows somewhat far advanced in the period of lactation, is often due to the fact that, at that period, the fat globules become much smaller and the cream more viscous. To obviate this, some food of a succulent nature should be given that will cause the secretion of milk to be of greater amount and not so viscous. Improper ripening and keeping the cream at too low a temperature is sometimes responsible for the difficulty of churning above referred to.

TAINTED OR DEFECTIVE MILK. The susceptibility of milk to taints and odors and the rapid growth of bacteria in it, when once it has been drawn from the cow are matters well known to all practical dairymen; but unfortunately are not taken into consideration by a large numder of farmers.

A bulletin by Prof. Russell, of the Wisconsin Station, treats of the cause, nature, and prevention of taints. He divides taints under two general heads—(1) those produced by living organisms, and (2) those due to the absorption of odors or to the derangement of the normal functions of the animal. He discusses the bacteria of milk, the manner in which they get into milk, the effect of temperature on their growth, and the specific fermentations which cause taints in milk and cheese. The direct absorption of taints before and after milking, the discrimination between directly absorbed taints and biogenic taints, the treatment of tainted milk, and the method of eliminating taints are treated of in logical order.

In concluding a comprehensive list of suggestions as to the care of milk, animals and utensils, Prof. Russell has this to say: "In caring for milk it should be remembered that two things are necessary: (1) to prevent the absorption of any foul odors; (2) to prevent the development of living organisms in the milk that are able to form foul substances that taint the same. The first can be accomplished by keeping taint-producing feeds from the cow and by keeping the milk in a place that is free from all undesirable odors. The second result can be attained by thorough cleanliness combined with a low temperature."

THE GERMS IN MILK. The New Jersey Station reports some interesting experiments into the increase of germs in milk from the time of milking, during the stages of handling, cooling and bottling, until it was put in cold storage.

In order to ascertain to what extent the germ contamination of milk was increased during the various stages of handling, cultures were made of a drop of diluted milk, in a gelatine culture medium, taking the milk as it passed from stage to stage in the handling and counting the resultant colonies. Only the best gelatine preparations were used. The test shows the number of germs in a single drop of milk.

When the milk was tested, immediately after each cow was milked, the number of germs in a drop varied from 70 to 3,332 per cow, nine cows being in the test. When the large can was full, its milk was found to contain an average from three samples of 1,575 germs per drop, the germ content having thus doubled. After bottling, the samples taken showed in four bottles 6,580, 5,040, 8,340 and 5,210 germs per drop, respectively. Four samples from a bottle that was to be kept in cool spring water and delivered next morning at the laboratory, just as regular customers are served, showed, 6,840, 7,704, 8,037 and 7, 429 germs per drop. Samples taken from this bottle next morning at the laboratory, proved that, in spite of the fact that the bottle had been kept in cold spring water, the germs had increased to over 11,000 per drop. This bottle was then kept in the laboratory at the ordinary temperature, with the result that a test taken at five p.m the same day showed about 300,000 germs per drop. Next morning the germs numbered from 1,000,000 to 3,000,000 per drop. This test was made on May 11th, 1897.

Six days later another successful test was made. Samples from a can of mixed milk, taken at 5 p. m , gave an average of 904 germs. After the milk was cooled it was found that 200 germs per drop had been added, or about 136,000,000 in all, to the whole can of milk while it was being passed through the cooler. The average milk in the bottles, as they were filled, contained 6,825 germs per drop, but those first filled tested 11,827 per drop, the larger number of germs in these being due to the fact that they received the first milk to pass through the valves of the filler, these being a fruitful source of germ infection.

At 10.30 next morning the milk kept in cold spring water showed 32,960 germes in each drop, which had increased to 80,184 an hour and a half later, in the temperature of the laboratory. At 9 a.m. in the same morning, samples were taken from milk which had not been kept in spring water with the result that the large number 247,744 germs were found in a single drop. At the same time a sample was taken from the same evening's milk, after it had been cooled but before bottling, which showed 117,390 germs per drop, a considerable reduction as compared with the milk that had been bottled, which shows that an enormous quantity of germs are added from the valves of the bottler, even when these are cleaned as completely as possible.

At the laboratory, under ordinary temperature, these various samples, twenty-four hours after milking, contained from 5,000,000 to 10,000,000 germs per drop, and the next morning two of the samples were coagulated. One not yet clotted gave nearly 60,000,000 germs to the drop ; another over 40,000,000 and the clotted ones 30,000,000 to 60,000,000. In these latter, however, the colonies came from huge masses of bacteria, and it was impossible to ascertain the exact number.

What further proof can be needed of the importance of the greatest care in guarding the milk from germ infection, by the strictest cleanliness of animals, milker and vessels.? Here we find that, even at the New Jersey Station, with every vessel well cleaned, the milk in its passage through the bottler receives an enormous addition of germs, and that too, at a season of the year before flies become troublesome. It would be instructive to ascertain how many germs would be found in a sample of milk taken from a dairy where not much care is taken in handling the milk.

Ropy Milk. Bulletin No. 3 of the Southern California Station gives the results of investigation into a bad case of ropy or stringy milk. It was a case of dirty stables, dirty clothing of those who milked, and insufficiently cleaned dairy utensils.

The test showed that, while milk drawn in the ordinary way into unsterilized vessels invariably became ropy, in not one instance did any ropiness ensue when the milk was drawn from these same cows with precautions that prevented the entrance of many living bacteria. Even the precaution of cleaning the teats and udder with ordinary water and the milking into a sterilized pail covered with cloth to exclude the dust prevented ropiness.

During the investigation it was found that the ropiness could be communicated to other milk by adding a little of the infected milk. The milk from some of the cows had a greater tendency to become ropy than that from others, and it seemed that the exterior of some of the cows was more infected with the troublesome bacteria than that of the others. Even the canals of the teats of one cow were infected, as was shown by the fact that her milk became ropy even though her udder and teats had been carefully cleansed outside. It is a sad commentary on the shortsightedness of some farmers that the owner of these cows, although the nature of the trouble and its cure were pointed out to him, refused to take the necessary steps to correct the evil.

CARE OF DAIRY UTENSILS. In the Year Book of the United States Department of Agriculture for 1896 is a thoughtful article by R. A. Pearson on the selection of dairy utensils, on methods and appliances for cleaning and sterilizing dairy utensils, on the care and cleaning of dairy rooms or buildings, clothing of operators and the thousand and one things to be considered in successful dairy work.

A great point made by the author is the importance of selecting only such dairy utensils as can be easily cleaned. He, says: "other things being equal, the more accessible the inside surface of an article for dairy use the more valuable it is. Any utensil having corners or parts which cannot be reached with water and a brush or cloth should be avoided. A vessel should be discarded if it has sharp, angular corners, unless they are absolutely necessary, for they require too much attention. All dairy utensils should be of hard material and have smooth surfaces Wooden pails should never be used for holding milk, as in the surface of the wood there are numberless small pores and fissures. The joints and rims should be made smooth, and the cracks entirely filled with solder. Cheap tinware is put together so carelessly that the joints are often rough and uneven, and little projecting points of solder make it difficult to move the cleaning cloth along the seam. Pails and other circular tin vessels should have but one seam on the sides; better ones are made without a seam. In order to facilitate the cleaning of the outside of utensils they should be so finished that every part can be easily reached by water and cloth. The outside of tinware should be finished as smoothly as the inside, and all wood apparatus should be carefully finished on the outside, being made smooth and having as few projecting nuts, rods, and braces as possible."

THE INFLUENCE OF SILAGE ODORS ON MILK. The objection is often made against silage that it imparts a flavor or odor to milk and butter, both when fed to cows and also when stored in a silo near the cattle. Some experiments to test the truth of this were made at the Wisconsin Station in 1894, when it was demonstrated beyond question that, when silage is fed a short time before milking, a sweetish odor is imparted to milk, by which it may be distinguished from milk from cows not fed with silage. It was also made clear that, if the silage is fed to cows just after milking, milk produced from it could not, in the majority of cases, be separated by the sense of smell from milk from cows fed on other feed. This is pretty much in the line of experiments carried on to test the effect on milk when cows were fed turnips at or before milking and just after milking.

It should be noted here, however, that while butter made from milk having the sweetest silage odor also possessed the same odor sufficiently marked to enable one familiar with it to classify the butter as being from silage milk, yet Chicago experts gave the silage butter in the Wisconsin experiment a higher score in point of flavor.

In 1897 further experiments were made at the Wisconsin Station. A quantity of sweet milk was divided into two lots, one of which was placed inside the silo on the silage for one hour. Both lots were then poured into cans and examined by a number of competent persons to see if they could detect the silage odor in the milk. Out of 120 such examinations the results in thirteen cases, or more than ten per cent., were incorrect. Again two lots of the same milk were taken to the silo, one being merely exposed in the silo for an hour, while the other had the air of the silo forced through it for the same length of time. In seven out of twenty-four examinations the milk was pronounced as having no silage odor, and it was agreed that the odors taken up by these lots of milk were much less perceptible than those found in milk from cows which were fed silage just before milking time.

To study the effect of silage odors on the acidity of milk, a quantity of sweet milk was divided into two lots, one being taken to the silo where, with a small hand bellows, air from the silo was forced through the milk 1,000 times. Both lots were tested for acidity with the result that the milk treated in the silo indicated less acidity than the other lot. In other cases æration of one lot with silo air and the other with outside air showed almost equal decreased acidity.

RESTORING THE CONSISTENCY OF PASTEURIZED CREAM. The use of pasteurized cream for domestic purposes has spread quite extensively of late, several dairymen in the larger cities being in the habit of putting up pasteurized cream in bottles.

The advantages of pasteurized cream are that it is more convenient to handle, there is less loss from spoiling, and it is free from disease germs. The cream will keep for several days without souring, so that a small jar of it can be kept on hand for use from day to day until exhausted. It has proved such a convenience that many families now use it regularly which had previously not cared to bother buying the small supply of cream needed for daily use.

A very serious objection to pasteurized cream, and one which has greatly retarded its more extended use, is its lack of consistency. It is thinner and less viscous than ordinary cream, and does not whip so readily. The Wisconsin station has for some time been seeking a remedy for this trouble, and has found that the consistency of pasteurized cream may be completely restored by the addition of lime in solution. Limewater alone is impracticable as it dilutes the cream too much, although even lime water materially increases the consistency of pasteurized cream. It was found, however, that lime dissolved in a solution of granulated sugar, which solution would contain a hundred times as much lime as lime water, produced the desired result without perceptibly changing the cream otherwise. This solution has been called "viscogen" on account of its viscous-producing qualities.

PREPARATION OF VISCOGEN. The method of preparing it is as follows:—Two and one-half parts by weight of good quality of cane sugar (granulated) are dissolved in five parts of water, and one part of quicklime gradually slacked in three parts of water. This milk of lime should be poured through a wire strainer to remove coarse, unslaked particles and then added to the sugar solution. The mixture should be agitated at frequent intervals and after two or three hours allowed to settle until the clear fluid on top can be siphoned off.

Where large quantities are made, it will be found convenient to mix the ingredients in a revolving barrel churn. The clear liquid (viscogen) should be kept in well stoppered bottles, which are filled full, because it absorbs carbonic acid from the air, thus reducing its strength, and also because, when air has access to the solution its color is darkened after a while. This last chemical change, however, does not, apparently, impair its usefulness.

It should be noted that the quantity of lime recommended in the above formula is considerably more than will be dissolved by the sugar solution. The reason for this is the amount of impurities in the Wisconsin lime, which contains nearly as much magnesia as lime. As the impurities are practically insoluble in sugar solution, they have no effect in the viscogen.

After the clear fluid is siphoned off, the residue still contains some of the sugar solution, which remains turbid for a long time. This sugar can be recovered by adding considerable water to the residue and allowing it to settle again, when the pure liquid can be poured off and used in the place of an equal quantity of water in the preparation of the next lot.

QUANTITY TO USE. The exact amount of viscogen required to restore the consistency of pasteurized cream depends on the amount of acidity in the cream. A safe, practical means of adding the right amount is to test the amount of viscogen required to neutralize a small measured quantity of cream, and then to calculate the quantity required for the whole amount of cream. The neutral point of the cream is shown by a little phenolph thalein solution; a drop of it mixed with a drop of the cream should give a pink color which quickly disappears; if the pink color is permanent, too much viscogen has been added.

In adding the viscogen to the cream, it should be poured into the cream slowly, stirring the latter constantly, in order to get a homogenous mixture. The pasteurized cream should be cooled to a point below 60° F. before the viscogen is added.

No objection can be urged against the use of viscogen on the ground of health, inasmuch as the amount of lime added, when the above rules are followed. will not exceed 0.6 of an ounce to every 100 lbs. of cream, or less than 4 parts in 10,000, and its effect on persons would be beneficial rather than injurious. In order, however, to avoid coming into conflict with laws which prohibit the addition of any foreign substance to milk it has been proposed to sell the product under the name of "visco-cream," "visco-milk," etc.

USES OF VISCOGEN. The bulletin concludes with the following purposes for which viscogen can be used:

(1) To restore the consistency of pasteurized cream, for which it stands pre-eminent.

(2) To increase the body of separator cream, and so overcome the objection urged against this in comparison with gravity cream.

(3) To increase the viscosity of cream for whipping, for which it is recommended, inasmuch as the kind of consistency imparted enables one to whip cream at temperatures that would otherwise be impossible.

(4) To give greater body to condensed milk where the method of preparation does not interfere with the use.

MOISTURE SUPPLY IN CHEESE-CURING ROOM. The best method of supplying moisture to cheese curing rooms has been under investigation at the Wisconsin Station. It was found that cloths hung up and kept moist answered best. The cloths are supplied with water from a three-quarter inch water pipe which runs along the top of the room. Very small holes were drilled about six inches apart on the upper side of the pipe. Strips of cotton cloth were hung over this pipe, and when the water was turned on it went through the holes, wet the cloths and flowed down through them. The flow of water through the pipe was regulated by a valve so that it would drip slowly from the bottom of the cloths. Under the cloths was a tray one foot wide and four inches deep for catching the dripping water and carrying it off into a drain. After the valve was once adjusted, a steady flow through the sheets was carried on for two weeks. One hundred square feet of cloth was used in the experiment, the curing room containing 5 000 cubic feet of space. Those in charge of the experiment considered that double that surface of cloth might have been used to good advantage.

FIELD CROPS.

SEED CORN. Several of the experiment stations have made tests of seed corn taken from different portions of the ear to see which were the most productive. At the Georgia Station the tests went to prove that kernels from the tip were equal, if not superior, to those from the middle and butt of the cob.

At the Kansas Station the butt kernels were taken from ears raised from butt kernels in 1895, and the middle and tip kernels from ears raised from middle and tip kernels respectively. Of the butts 85.9 per cent. germinated, of the middle, 90.3 per cent., and of the tips, 72.9 per cent.

The average for five years showed that there was not much difference, although the corn from the butt kernels was slightly higher, averaging 39.74 bushels per acre. That from the tip kernels averaged 39.04 bushels and from the middle kernels 38.52 bushels

The Ohio Station experiments, which covered a period of nine years, showed similar results, the difference in the crops of corn from different portions of the ear being immaterial.

YIELD OF CORN SOWN IN HILLS, DRILLS AND BROADCAST. During 1895 and 1896 the Cornell Station devoted considerable attention to the comparative yields per acre of corn sown in hills, drills and broadcast. The average for the two years is given as follows : Corn in hills, 17,070 pounds of stalks, 5,640 pounds of grain, or a total of 22,710 pounds. Corn in drills gave 19,815 pounds of stalks and 4,352 pounds of grain, or 24,167 pounds in all; while corn sown broadcast produced of stalks (no grain being formed) 29,585 pounds, the broadcast method of seeding thus giving the largest crop.

An analysis of the crop of 1895, however, made when the crop was in the best condition for forage, showed that the percentage of each food constituent—protein, fat, nitrogen-free extract and fibre—was the smallest in the corn which had been sown broadcast and greatest in that sown in hills, with the single exception that the drilled corn contained a slightly higher percentrge of fibre, which is the least valuable constituent.

The corn grown in hills thus ranked first in feeding value, although it produced the smallest weight of crop, while the absolute feeding value of the broadcast corn was, in view of its large yield, somewhat greater than that of the drilled corn.

A serious objection to corn sown broadcast is that it is quickly affected by drouth. Cultivation of the soil is absolutely needed in order to keep it moist enough to supply the demands of the growing crop, and this cannot be done where corn is sown broadcast Moreover, corn does best when the sunlight can permeate to every part of its structure.

MANURE FOR THE CORN CROP.—An annual test was made during six years of corn culture on the same land at the Massachusetts Station to compare the effect of applications of six cords of manure per acre, and of four cords of manure together with 160 pounds of muriate of potash per acre. The manure applied alone gave the best results. In connection with these experiments hill and drill culture were tested. Drill culture produced the largest yield. As a green manure, where corn is grown continuously, white mustard sown in the standing corn, when it was receiving its last cultivation, was found worthy of recommendation.

PLANTING AND CULTIVATION OF CORN. A number of experiments in early and late planting of corn during periods of five, six and seven years at the Indiana Station indicated that the best results are to be obtained by planting between the 1st and 10th of May. The highest average for eleven years resulted from planting stalks fourteen inches apart in the row. It was noticed that, in dry years, the yield of stover increased with the thicker planting while the yields of grain decreased, yet, on the whole, a greater total yield of corn and stover was obtained from the thicker planting.

Tests of cultivating drilled corn from one to four inches deep showed that the best average yield was obtained when the cultivation was two inches in depth.

LOSS BY EXPOSURE OF CORN FODDER. That corn fodder left in the fields until required for feeding purposes loses much of its feeding value is well known to the careful agriculturist ; but how much of its properties it loses is not often considered by a large number of farmers. Some light is thrown on this question by some analyses made at the Oklahoma Station of corn fodder taken from the inside and outside of the shocks which had stood in the open field all winter.

The results show a considerable reduction in the feeding value of the corn stover, equal, in the opinion of those who conducted the test, to fully one-fourth of its original worth, with a corresponding increase in the crude fibre, the least valuable part.

So long as corn fodder is left out in the fields, the only way to reduce this loss in feeding value is to place the sheaves in stacks with only the butts exposed or else to keep them in long narrow shocks supported by a central pole on posts. The better way, however, is to build a silo and turn the corn into silage.

Alfalfa. The Colorado Station has been making exhaustive studies on the growth of the Alfalfa plant, its changes in composition at different stages, its fertilizing value, the vitality of Alfalfa seed, etc.

The conclusions reached are that Alfalfa is a suitable and excellent crop for a large variety of soils and climates, the most trying and fatal condition to its growth being a cold wet winter and poorly drained or water logged soils. Analyses made of the leaves at different stages of growth, from the time the plant begins blooming until after blooming, show that the air-dried stems contained about 6.35 per cent. of protein and about 28 per cent. of nitrogen-free extract (carbohydrates), while the air-dried leaves, up to the time the plant ceased blooming, contained all the way from 22 to 25.5 per cent. of proteim and from 40 to 45 per cent. of nitrogen-free extract. The leaves are also much richer in fat, but the stems contained four or five times as much crude fibre as the leaves.

The amount of fat contained in the leaves must be borne in mind when considering the question of making Alfalfa into hay, inasmuch as the leaves being brittle, they are readily broken off in handling, and a considerable portion of them are thus left in the field. As to the different crops of Alfalfa (three in number) in the test, the average percentage of protein did not differ very greatly, although the protein was somewhat higher in the crop first cut. It was found that the hay cut just at the beginning of bloom is richer in this constituent than that cut later. From the beginning of bloom to half bloom the amount of protein seems to be nearly stationary and the crop is probably at its maximum. The crude fibre of the whole plant gradually increases as the plant matures.

A comparison of Alfalfa hay with clover hay showed that 100 pounds of clover hay contained 47.5 pounds of digestible food, of which nearly 7 pounds is protein, while 100 pounds of Alfalfa contained 54.5 pounds of digestible food with over 11 pounds of protein. Such experiments were made at the Colorado Station in making Alfalfa into silage, with good results. Cows ate it freely, even while on green pasture. It kept in good condition and an analysis showed it to be nearly twice as rich in protein as ordinary corn silage.

The amount of fertilizing materials removed from the soil in a ton of Alfalfa hay is given as 54 pounds of nitrogen, 8.27 pounds of phosphoric acid, and 50.95 pounds of potash. Over 40 pounds of lime are also removed. As regards the nitrogen, however, Alfalfa derives its supply largely from the atmosphere, so that the soil is not a loser to any great extent.

In respect to the vitality of Alfalfa seed the indications were that it was not materially affected by keeping for six years. The strange claim is made that screenings or the poorer seed gave as satisfactory results as prime seed.

Crimson Clover. Some recent experiments by the New Jersey and Michigan Stations throw some light on the best time and manner of seeding this crop under different conditions of soil and climate.

In one of the New Jersey experiments the clover was sown on rather heavy clay loam soil on August 4th, 13th, 29th and October 1st. The best results were obtained from the earlier seedings, the difference between the crops of the first and second seedings being very small. The seeding of October 1st proved a failure.

The second experiment was made on a soil ranging from a coarse sand to a sandy loam. The crop from seed sown July 11th was destroyed by hot weather soon after it began to grow. Seed was sown July 21st among tomatoes, but this seeding was also destroyed by the hot weather. From seed sown the same day among citron vines, which gave better protection than the tomato vines, a thin stand was obtained, and the plants made a good growth the following spring. Seed sown August 4th on a plot, on which a crop of peas had been turned under, gave satisfactory results, except that the plants lodged. August 18th seed was sown among late tomatoes. A good stand was obtained and the crop made a vigorous growth. Seed was sown September 14th and the plant came up in three days. A good stand was obtained, and the growth during the fall was promising. The plants, however, were small when winter set in, and, being unprotected, many were killed, while the rest were stunted. Seed was sown September 20th in a citron patch, being put in with a cut-away harrow. The plants were protected by crab grass and the remaining citron vines and stood the winter well, but were small as compared with those of the earlier seeding. Seed sown at the same time in an old sand field without protection did not do well, many of the plants being destroyed during the winter. A stand of clover was obtained, however, from seed sown in an orchard September 29th and put in with a cut away harrow. Of the seeding made with rye October 4th and 23rd few plants survived the winter, and the majority of these had but a single branch.

In the third experiment on sandy loam soil the seed sown with rape June 8th gave a rather uneven stand, but the crop made a good growth during the fall.

CRIMSON CLOVER IN MICHIGAN. At the Michigan Station half an acre of crimson clover was sown with oats in the spring. After the oats were cut the clover made a rapid growth, yielding 5,134 pounds when cut for green feed, October 23rd and November 12th. Another plot of equal size sown without grain grew rapidly from the start, and when cut, June 24th, yielded 1,870 pounds of green feed, or 418 pounds of hay. It produced a second crop on which sheep were pastured for about six weeks during August and September. After the sheep were removed it made a further small growth.

At the same station in 1896 a one-tenth acre plot of crimson and red clover was sown the last day of every month, beginning in March. The yield of crimson clover was, on the whole, apparently somewhat greater than that of the red clover. The March crop of crimson clover matured a crop of seed early in August, but the plants, instead of dying thereafter, as in in previous years, continued to put forth blossoms until checked by hard frosts. Late in October nearly all the plants in this plot died. The April plot did not seed so abundantly, but the clover which seeded freely in the other plots died at the same time as those in the March-sown plot. The plots which produced little or no seed remained green and thrifty. The plots sown the last of May produced only an occasional blossom and entered the winter with a thick mass of verdure about eight inches deep. The latter-sown plots were of smaller growth, and those sown after August 1st were so little advanced that they were hardly likely to survive the winter.

Taking the result of the experiments at the Michigan station, the climate of which would more nearly approximate that of Ontario, it is evident that spring seeding gives the best results. A good crop is secured the same year and the clover is left in as good a condition as possible to withstand the serious inroads of winter on it, which are apt to destroy it. This plant does well in some parts of southern and western Ontario, but so far has proved worthless in eastern and northern Ontario.

MILLETS. At the Massachusetts station Japanese "barnyard" and Japanese "common" were found to be the best millets for seed production. Seventeen varieties were tested to see which produced the largest yield of hay, with the result that Japanese "White panicle" and Japanese "barnyard" stood first and second respectively.

FLAX CULTURE. It has always been held that flax growing makes a heavy draft on the fertility of the soils. In order to test this the Minnesota station has recently been making some investigations which throw considerable light on this point.

It appears that many of the crops ordinarily grown remove more plant food from the soil than the average flax crop. This is especially true of corn. The oat crop removes about the some amount of nitrogen and phosphoric acid, but nearly as much again of potash as the flax crop. The necessity for a fertile soil in successful flax-growing is due therefore, not to the fact that this crop requires larger total amounts of fertilizing constituents than other common farm crops, but to the fact that, although it is a somewhat dainty feeder with a small root system, it must secure the necessary plant food for its perfect growth in a short growing period of from sixty to one hundred days. The plant food must, therefore, be not only abundant but in a readily available form.

Flax culture makes the heaviest draft on the nitrogen of the soil. This explains why flax succeeds best on virgin soils, because nitrogen is more abundant in them. It is also a strong reason why clover should be included in a crop rotation with flax.

The Minnesota station also carried on experiments to see why flax could not be grown continuously on the same soils. It was found that the flax roots and straw in their decomposition produce products which destroy the following flax crops. When a period of five to seven years intervene between two flax crops, the old straw and roots are then thoroughly decomposed and will not injure a new flax crop. Flax must, therefore, be grown in rotation with other crops, unless new land is available. The rotation should include a hoed crop in order to keep the soil clear of weeds. Green manuring and the ploughing in of clover stubble is the most economical way of keeping up the fertility of the land.

SELECTION OF POTATOES FOR PLANTING. The North Dakota station reports an experiment during two seasons in the selection of potatoes for seed, making comparison of the growth from large and small tubers from the same vine. In 1894 the tubers were selected from hills of normal growth, which indicated that their origin was from a single seed piece and which showed considerable difference in growth, number, size and form of the potatoes. Small tubers were selected from those weighing between one and a quarter and two ounces, and large ones from those exceeding six ounces in weight. The specific gravity of the tubers was found to be essentially the same for large and small tubers from the same hill, but often very different in different hills. After the selected potatoes had been treated with corrosive sublimate for the prevention of scab, one piece, an ounce in weight, was taken from the bud end of each tuber. These pieces were planted in the spring of 1895 three feet apart each way and four inches deep, with the cut surface down, only one piece being planted in each hill. The average weight per hill from the small tubers when dug was 2.1467 lbs, and of that from the large tubers, 1.92 lbs.

The preparation for the next year's crop was made as above, the only hills from which no seed was planted being those which had produced only large or only small tubers. The average yield per hill in 1896 was 26.54 ounces from those planted with pieces of small potatoes, and 25.45 ounces from those planted with pieces of large potatoes.

At the Wyoming station the yield from small potatoes planted whole was greater than from cuttings made of large potatoes, but the percentage of marketable tubers was less from the whole seed. Potatoes planted eight inches apart in the rows gave the best results. Green manuring with peas resulted in an increase in yield of more than thirty-eight per cent. During a cold wet season it was found that seed treated for scab with corrosive sublimate produced a good stand, untreated seed planted with bone meal in the furrow produced a partial stand, while untreated seed without bone meal failed to grow.

The relative yield of potatoes grown from seed cut from the bud end, centre, and stem end of the potatoes at the New Jersey station was conclusively in favor of the centre pieces. Three varieties of potatoes, the Early Rose, American Giant, and Rural No. 2, were tested.

FLAT PEAS AND SACCHALINE. A number of experiment stations have made tests of flat peas and sacchaline, in every instance with poor success. Professor Fletcher, of Ottawa, calls the latter "a gigantic humbug." We shall, probably, not hear much more about these two crops.

THE SUGAR BEET. Farmers' Bulletin 52 of the U.S. Department of Agriculture gives considerable information about the culture of sugar beets. The best soils are those having good drainage and good capillarity. Barnyard manure should be applied one or two seasons before the sugar beets are grown, as fresh applications reduce the sugar contained in the beets. Heavy, non-nitrogenous manures injure the quality of the beet not so much by decreasing the sugar content as by increasing the percentage of non-sugars. The growing of sugar beets in rotation with other crops is recommended.

The author recommends late fall plowing at least nine inches deep, and, on stiff soils, sub-soiling to the depth of six or seven inches more. Thorough surface cultivation should be given before planting, which should be done as early as possible, as the early planted beets give a larger yield and a higher content of sugar than late planted beets.

An estimate is made of the cost of growing beets on land worth $75 per acre, with labor at a $1 per day and the distance to the factory not more than three miles. This is given at $59.50, and the return, with a yield of fifteen tons of beets per acre at $4.50 per ton, is given at $67.50.

The plants retained for seed should be smooth and regular in shape. They should weigh from twenty to twenty-four ounces, and be selected from beets of the best quality. The leaves are to be removed without injuring the neck, and the roots stored during the winter. In the spring the sugar content and the coefficient of purity of each root having a specific gravity above a certain point are determined, and the selected beets are then planted and a record kept of each beet. The seed produced is used solely for the production of the seed of commerce in the fourth or sixth year from the parent. Experiments indicate that home-grown seed is better than that imported from abroad.

SEEDING WITHOUT GRAIN. Experiments conducted at the New Jersey station as to the practicability of securing a good stand of grass without a nurse crop of grain showed that, where the land was in good heart, or was fertilized at the time of seeding, a good catch of grass was secured without any trouble. The tests were made in old sod, after oats and potatoes, and after oats.

INFLUENCE OF BUCKWHEAT ON SUCCEEDING CROPS. A small experiment was conducted at the New Jersey station to test the effect of buckwheat on a succeeding crop of turnips. Two crops of buckwheat were turned under. The effect was to largely increase the crop of turnips. This disposes of the idea held by some farmers that buckwheat acts as a poison to the crops that follow it.

SEED SELECTION. Farmers' Bulletin No. 73, issued by the United States Department of Agriculture, contains some timely remarks on seed selection, which has such an important bearing, not only on the immediate crop, but frequently on many subsequent ones. All seeds should be carefully examined before planting in order to test their purity and vitality. The introduction of foul weeds and disappointment from sowing seeds of low vitality are thus avoided.

The vitality of seed is influenced by a number of factors, among which are the kind of seed, degree of maturity at harvesting, methods of handling, water content, and temperature at which germination takes place. If thoroughly dried, seed will withstand almost any degree of cold, and may, for a few minutes, be subjected to a dry heat equalling that of boiling water without injury.

When immature seed is sown the tendency is to produce an earlier and more prolific product, as has frequently been done with tomatoes, but this is carried out at the expense of the ultimate vitality of the stock.

The age of seeds is an important factor in their vitality. A very few seeds, such as those of cucumbers and melons, are supposed to increase in value till they are three years old. On the other hand, some seeds become worthless in a short time. In an experiment it was found that barley and oats retained their vitality for ten years, wheat fell off nearly one-half and rye became practically worthless in that length of time. Tests of forage plants in England showed a depreciation in vitality during two and one-half years amounting to from eleven to 100 per cent.

Experiments show, almost without exception, that the largest and heaviest seed tend to produce the largest and most vigorous plants. For this reason the too common practice of selling the best clover and grass seed and saving the screenings for the farm cannot be justified in any way. Not only do these contain many weed seeds, but what pure seed is in them is generally small and inferior.

It was found in some investigations in France that sulphate of ammonia, chlorid and sulphate of potash, nitrate of soda, and ammoniated superphosphates, when in contact with the seed, injuriously affected their germination. The amount of the different chemicals used was, it is true, considerably in excess of the quantity ordinarily applied to the soil, but, at the same time, this fact should be borne in mind by those using such fertilizers at the time of seeding.

The bulletin refers to the advantageous results obtained from sowing seed grown on soils of a certain character on soils of a different texture, such as changing from a sandy to a clay or lime soil. It also mentions the benefit derived from a change of seed from one locality to another, notably from north to south.

GOOD ROADS.

Broad *Versus* Narrow Tires. Experiments conducted at the Missouri station for two years on macadam, gravel and dirt roads, in all conditions, and on meadows, pastures and plowed fields, both wet and dry, showed that, as a general rule, the draft was consideralby less when tires six inches in width were used, than when the tests were made with tires of standard width, viz., one and a half inches.

It was found that on a macadem road a load of 2,518 lbs. could have been hauled on the broad tires with the same draft that a load of 2,000 lbs. required on the narrow tires. On a gravel road, except when it was wet and sloppy on top, the results were about the same. The same favorable results were found on a dirt road when dry, hard and free from ruts. When, however, the surface was covered with two or three inches of very dry, loose dust the draft of the broad tires was greater than that of the narrow tires, as it was on a clay road, muddy and sticky on top and firm underneath. When tested on a clay road with mud deep and drying on top, or dry on top and spongy underneath, the difference in favor of the broad tires amounted to from 52 to 61 per cent., or, in other words, a load of 3,200 lbs. could have been hauled on the broad tires with the same draft required to draw 2000 lbs. on the narrow tires. As the road dried and became firmer the difference in favor of the broad tires diminished until it reached about 25 or 30 per cent. On the other hand, as the mud became soft and deeper, the difference diminished until the condition arrived when mud adherod to both set of wheels, when it was found that the narrow tires pulled materially lighter.

On a clay road with a dry surface, with deep ruts cut by the narrow tires in the ordinary use of the road, the first run of the broad tires over the ruts showed a material increased draft as compared with that of the narrow tires. The second run of the broad tires, however, in the same track completely reversed this. Where the ruts were 8 inches deep, with rigid walls, three runs of the broad tires over the ruts in its own track eliminated any disadvantage against them in favor of narrow tires.

A large number of tests on meadows, pastures and plowed ground, in every condition, proved without exception that there was a difference in draft in favor of broad tires of from 17 to 130 per cent.

Six inches is recommended as the best width of tire for a combination farm and road waggon. Both the axles should be the same length, so that the front and hind wheels will run in the same track.

FERTILIZERS.

Lime as a Fertilizer. The beneficial effect of lime has heretofore been ascribed mainly to its action in improving the texture and drainage of the soil, in hastening the decomposition of organic matter in the soil, in rendering the inert nitrogen of the soil humus more available to plants, and in assisting in setting free the potash and other inert fertilizing constituents of the soil. Recent investigations, however, have shown that it performs other equally important functions in the soil, and that in its abundance or deficiency there is a matter of greater importance than it was formerly supposed to be.

It has been generally assumed that there is sufficient lime in most soils to meet the demands of ordinary crops. The Minnesota, Rhode Island and other stations, however, have shown that, except in limestone regions, it is as likely to be deficient as potash or phosphoric acid. Especially is this true of soils derived from decomposition of granite. In testing the fertilizer requirements of soils it becomes as important, therefore, to determine whether lime is deficient as whether potash and phosphoric acid are lacking. A deficiency of lime may be due to continuous cropping without liming, or to leaching out lime, a process which is continually going on, and which is greatly hastened by the use of certain fertilizers, especially muriate of potash. The use of this and similar fertilizers on a soil not abundantly supplied with lime should be accompanied by periodical applications of lime.

A deficiency of lime in the soil is accompanied by a state of acidity, or sourness, fatal to the vigorous growth of many crops. The Rhode Island Station shows that this condition may be present even in upland soils which are well drained, as well as in low, wet soils. It was found that sulphate of ammonia was actually poisonous to plants on such soils when it was not used in connection with lime. This beneficial effect of lime was probably largely due to the fact that the lime restored the alkaline condition of the soil necessary to the transformation (by nitrification) of the sulphate of ammonia into the nitrates so necessary to many crops.

In experiments conducted by the Rhode Island station with 150 varieties of plants on these acid soils before and after liming it was found that most of the plants were greatly benefitted by the use of lime. The chief exceptions were watermelons, blue lupines, Redtop, Serradella, and the common Sorrel. The use of lime had a marked effect not only on the yield but also on the quality of certain root crops. It was found, however, at the Rhode Island, New Jersey, and North Dakota stations that applications of lime increased the amount of scab in potatoes. On the other hand, lime at the rate of 75 bushels per acre proved a very effective preventive of club root of cabbage and turnips, and reduced the soil rot of sweet potatoes at the New Jersey station, and, further, lime tended to make sweet potatoes round.

When to apply lime. The Rhode Island station recommends that lime be applied by sowing after plowing and then thoroughly incorporated into the surface by means of a harrow. It is best not to lime just before growing a crop of corn, rye or millet, as lime when first applied is usually more or less caustic, and in this state is liable to injure the crops, especially when the soil conditions induce rapid nitrification of the soil nitrogen or the nitrogen applied in natural and artificial manures. If, however, the soil is very sour and nitrates are not employed, then the use of lime immediately before these crops may prove of great service. Under all circumstances lime should be harrowed in immediately or it is liable to cake with the soil, and then will not yield the best results. It has been found that for vegetables lime may be applied to great advantage in the spring.

Quantity of Lime per Acre. The quantity of lime to be applied on light, dry, sandy soils is given as one-half to one and a half tons per acre, and on heavier soils as one to three tons. One application during a rotation lasting from five to seven years is considered sufficient. In 124 instances during an experiment lasting four years at the Rhode Island Station limed soil was more productive, and in 33 cases less productive than unlimed soil.

CAN FARMERS MIX THEIR OWN FERTILIZERS ECONOMICALLY? A number of experiment stations have for some time been studying this question in conjunction with their official inspection of fertilizers, and have unanimously decided that, under certain conditions, it is quite practical and economical for farmers to buy the different fertilizing materials in the crude state and mix them on the farm.

When farmers combine and purchase their supplies in large quantities for cash and make their own mixtures, they secure their fertilizers at a greatly reduced cost. The New Jersey station investigated this subject in 1895 and found that a number of farmers in that state purchased over 1,000 tons of fertilizers in the crude state which cost them on an average $28.62 per ton. These ingredients, at the valuation made at the station, were worth $31.68 a ton, and would have cost if purchased mixed at the factory $43.12 a ton. Here there was a saving of $14,500 on the whole amount. Such a saving as this is well worth looking after. It can only be secured by farmers buying in bulk for cash. The market prices of the fertilizing materials bought in small quantities are frequently so high as to render home mixing impracticable, but Institutes could buy by the carload and thus secure the full advantage of reduced prices for purchase in bulk.

How to Mix Fertilizers. Fertilizer mixtures uniform in quality and equal in every respect to the best factory-made fertilizers can be made on the farm without milling machinery. A tight barn floor, platform scales, screen, shovel and hoe are the only utensils needed. The materials, having been weighed, are screened and lumps pulverized, the most bulky stock is spread in an oblong pile from six to twelve inches deep; upon its leveled top the next material is placed, and so on until all have been added, like layers on a layer cake. Commencing at one end, the pile is shovelled over, the operator reaching clear to the bottom every time. The pile is then leveled up and the operation repeated three times. The mixture may then be screened again if desired.

In thus mixing his fertilizer, the farmer knows definitely what he has purchased. Each ingredient can be tested by itself if desired, and inferior materials are not so likely to be palmed off on him. He can also vary the proportions of the ingredients to suit the requirements of varying soils.

LOSS OF SOIL FERTILITY IN DRAINAGE WATER. Under certain circumstances, depending upon the character of the soil, the treatment to which it is subjected, and the fertilizers applied, the loss of soil fertility in drainage waters is considerable. Leachy soils part very quickly with the fertilizing materials applied to them unless covered with crops which utilize the fertilizers promptly.

Certain fertilizers have a tendency to set some of the soil constituents free and thus throw them into the drainage water. As mentioned elsewhere, muriate of potash converts the insoluble lime compounds of the soil into a very soluble form, which readily passes into the drainage water. Gypsum and salt are believed to set free the potash and other fertilizing constituents of the soil, thus rendering them more available to plants, but, at the same time, more likely to be washed out and be lost in the drainage water. Numerous chemical examinations of drainage water, however, made at several points would seem to show that under ordinary conditions the loss of lime, potash or phosphoric acid in drainage waters is not very large.

As regards nitrogen, the case is different. The soil appears to have very little affinity for the forms of this element so extensively used in fertilizers—nitrate of soda and sulphate of ammonia—and if they are not quickly taken up by the crop, they are likely to be lost in the drainage water. Moreover, the insoluble nitrogen of the soil, or that applied in the form of fertilizers, which are largely insoluble when applied is rapidly converted by the process of nitrification under favorable conditions into nitrates, which are readily available to plants, but which pass out into the drainage and are lost if not promptly taken up by the crop.

In an experiment to test this it was found that the loss of nitrogen in the drainage from a bare soil in the course of a year was over 160 pounds per acre, while the loss from a soil covered with a crop was but trifling, although fully as large amounts of nitrates were found in the latter case as in the former. This shows the importance of keeping a leachy soil covered with a crop in order to prevent a loss of nitrogen. By adopting this practice the farmer will protect his soil from leaching and surface wasting, two factors which most seriously injure the fertility of soils.

BARNYARD MANURE. It is well known that barnyard manure, if neglected, rapidly loses the greater part of its fertilizing value and becomes practically worthless, except to improve the mechanical and physical properties of the soil. It is also well understood, by practical men, that it is not economical to carry out some of the elaborate methods of preservation which have been suggested. To be economical, the method of management must be simple and involve as little labor and expense as possible. Scientific men have been directing their energies for some time in the line of simplifying methods of management and preservation of farm manures, a summary of which is given in Farmers' Bulletin 56 of the U. S. Department of Agriculture.

Inasmuch as the direct fertilizing value of manure depends so largely upon the nitrogen which it contains, the investigations have been mainly, into the availability, changes, and causes and prevention of loss of this substance. There is a wide difference between the fertilizing value of the nitrogen of the solid and liquid parts of the manure. The effectiveness of the former has been found in experiments to be only ten per cent. of that of nitrate of soda, while that of the latter was over ninety per cent., being very nearly equal to that of sulphate of ammonia. The nitrogen of the solid excrement becomes available very slowly in the soil or in the heap, while that of the urine is in a soluble form, rapidly converted into ammonia which may escape into the air. It was found that the effectiveness of the nitrogen of the solid excrement is not materially increased by mixing it with the liquid part, the nitrogen of such a mixture being decidedly less available than that of either nitrate of soda, sulphate of ammonia or green manures. The conversion of the nitrogen of the urine into ammonia, moreover, is apparently hastened by the admixture of solid excrement and straw.

Changes in manure the result of organisms. The changes which manure undergoes, which it brings about in the soil, and which so largely determine its fertilizing value, are mainly the work of micro-organisms, which, though insignificant individually, multiply with astonishing rapidity, and are thus able to accomplish startling results. These micro-organisms begin their work as soon as the manure is voided; in fact it is believed that many of them come from the stomach of the animal along with the manure. At any rate the air and litter of the stable swarm with them, and the odor of ammonia, which can be detected very soon after the excrement is voided, shows that they commence their work without delay. These organisms are of various kinds. Some require air (or oxygen) in order to grow; others flourish only when oxygen is absent. Most of them affect the quality of the manure injuriously, but some may be made beneficial. The management ot manure thus becomes largely a question of controlling these minute organisms.

Checking the action of the organisms. The most effective means of checking the action of the organisms which require oxygen for their growth is to exclude the air. During experiments it was found that they were capable of completely converting the nitrogen of urine into ammonia, which escaped into the air in twenty four hours when air was freely admitted, but that the escape of ammonia was almost entirely prevented by excluding the air, although the nitrogen was still largely converted into ammonia. The same changes occur in the solid excrement, but much more slowly. In one experiment mixtures of dung and and litter, which were exposed to the action of the air, were found to lose as high as seventeen per cent. of the nitrogen which they contained in about seven months. In other experiments in which a current of air was drawn through the manure the loss was over forty per cent. It is due to the beneficial effect of excluding the air that deep stall manure has been found so much more effective than manure stored in an ordinary pile. Mærcker, an eminent German investigator, has recently found in experiments with oats that the nitrogen of deep stall manure compared favorably with that of sulphate of ammonia and nitrate of soda, while ordinary barnyard manure was either without effect or lowered the yield. The unsatisfactory results with the latter are accounted for not only by the fact that the manure had probably lost a large part of its fertilizing value by careless treatment, but also because the manure as well as the litter mixed with it contained peculiar micro-organisms, known as denitrifying organisms. which are capable of converting available nitrogen into forms which are of little or no use to the plant when the manure is applied to the soil. In these experiments, moreover, the manure was applied in much larger amounts than is usual in practise and the denitrifying organisms were thus distributed in the soil in sufficient numbers to work injury. Other experiments indicate that when manure is applied in the usual amount this is not likely to happen.

Careful attention to the construction of the manure pile so that air will be as completely excluded as possible, keeping the heap moist, and avoiding alternate wetting and drying, have been suggested as means of preventing loss of valuable fertilizing constituents and of promoting a decomposition which will largely reduce the power of the manure to convert available nitrogen into the less valuable or useless forms in the soil. Here we have an explanation of the effectiveness of well-rotted manure; not only is the availability of its own nitrogen increased, but its power to injuriously affect available nitrogen from other sources is reduced.

One point which has been clearly brought out by recent investigations is that the addition of straw may very decidedly reduce the fertilizing value of manure, the injurious effect being greater the larger the amount of straw used. The excessive use of straw as litter should therefore be avoided if the most effective manure is desired.

HORTICULTURE.

Cross-Pollination in Relation to Fruitfulness. It is well known to experienced fruit-growers that a large number of different species of fruit are self-sterile, that is to say, they must receive pollen from other varieties in order to insure the production of fruit. Several investigations into the cause and extent of this self-sterility have been held by some of the stations.

The pollination of peas has been studied by the U. S. Department of Agriculture. Extensive experiments were conducted in three localities in New York and one in Virginia. They were continued through two seasons and included work with thirty-eight varieties. A majority of those tested were entirely self-sterile, but fruited well when pollinated by other varieties. Pollen from another tree of the same variety appeared to be no more effective than from another branch of the same tree or than from the same flower. A number of varieties were found to be self-fertile, but, even with these, cross-pollination appeared to be more certain and more satisfactory under adverse conditions. There were shown to be marked differences between self and cross-pollinated fruits of the same variety, especially in the case of Bartletts and Buffums, and also fairly well pronounced in Anjou, Angoulême and Heathcote trees. Self-pollinated fruits are somewhat smaller, tend to be narrower, and not so well filled out toward the blossom end. Most of them are entirely seedless. They also tend to ripen slightly later than cross-pollinated ones—this, however, being more noticeable with late than early varieties.

Experiments were made with apples and quinces similar to those with pears. The quince was found to fruit nearly as well with its own pollen as with that of another variety. As regards apples, it appears that the several varieties are more inclined to be sterile to their own pollen than the pears. With the former, in the great majority of cases, no fruit results from self-pollination. The results, however, were less conclusive than with pears, because on most of the self sterile varieties of apples an occasional fruit set under self-pollination, and none of the varieties were very completely self-fertile.

The New York State station had studied the sterility of grapes for several years. Of the 145 varieties studied, 86 were practically self-fertile, and 59 were either entirely self-fertile or produced imperfect clusters when self-pollinated. Of 116 varieties tested at the Georgia Station 90 were mostly self-fertile and 26 mostly self-sterile.

In a test with plums at the Vermont Station but one variety out of fourteen tested set fruit normally by self-pollination. The European and Japanese plums have not hitherto needed cross-pollination, self-sterility being confined, so far as is known, to American plums. It is probable that some cases of apparent self-sterility in plums are due to defective pistils rather than to any impossibility of self-fecundation.

In a test with peaches reported by the Delaware Station a number of varieties either failed to fruit or fruited poorly when covered to prevent cross-pollination

Among the smaller fruits, instances are found of self-sterility amongst raspberries, blackberries, dewberries and gooseberries, while certain varieties of strawberries, pistillates, as it is well known, will not produce fruit satisfactorily unless mixed with perfect-flowered varieties.

Some of these self-sterile varieties of fruits are the most desirable for many reasons and, on that account, discarding them is out of the question. They should, therefore, be planted in orchards containing other varieties. As we have seen, even self-fertile varieties are benefitted by being planted near trees of a different variety. In cases of unproductive orchards of but a single variety top-grafting part of the trees with other varieties is recommended, care being taken to mix varieties that bloom at the same time.

WINTER PROTECTION FOR PEACH BUDS. Various means of protecting peach buds from winter-killing have been tried at the Missouri Station. Of these the effect of whitening the trees and buds has received most attention. In the winter of 1895-96 a row of young trees, running diagonally across the orchard, and four older trees were sprayed with lime and whitewash. The winter was remarkable for its changeable temperature. During warm periods the unwhitened buds grew perceptibly before any swelling could be detected in the whitened buds Longitudinal sections of whitened and unwhitened buds, taken March 20th, showed that in all cases the unwhitened buds had made considerably more growth than whitened ones, and that, in many cases their pistils were injured. Whitened trees blossomed about one day later than the unwhitened ones. It was thought that the difference in time of blooming was much less than it would have been in a normal season, inasmuch as the weather became suddenly warm, with a dry wind, which forced all varieties into bloom at the same time. Only twenty per cent. of the flowers that opened on the unwhitened trees were uninjured, and only a few of these set fruit. On the treated trees eighty per cent. of the flowers were perfect, and more fruit set than on the others.

In the winter of 1896-97 the same trees were again whitened. Early in March buds of the unwhitened trees were perceptibly swollen while the whitened ones were still dormant. Early in April the unwhitened buds were nearly ready to open, while the others were much less advanced. The unwhitened buds opened from two to six days earlier than the others. On the whole, the whitened buds set more fruit than the unwhitened.

At first a common lime whitewash was used, but it washed off badly in rainy weather. A whitewash of lime with one-fifth skim milk added to the water and one pouud of salt per bucketful proved more satisfactory. The whitwash was applied with a spray pump. Four sprayings during the winter and spring were sufficient, two sprayings having been given at the beginning in order to insure a thorough whitening. About half a bucket-full of whitewash was used per tree at each spraying. The entire cost per tree did not exceed ten cents.

In order to test the relative absorption of heat by the different colors, four standard thermometers covered with lime, colored respectively green, purple, black, and one with whitewash, were exposed in the open air. The darker colors absorbed more heat than the lighter ones. A difference in temperature of ten degrees to fifteen degrees was frequently shown between the white and the purple bulbs, and once in the very bright sunshine the difference ran as high as twenty-one degrees. This shows how whitening the green and purple twigs of peaches tends to keep them dormant during the warm days of winter.

In the winter of 1895-96 a few peach trees were protected by drawing the limbs together with a rope, covering them with cornstalks, and binding the whole into a bundle. About eighty per cent. of the fruit buds thus protected were uninjured, while only twenty per cent. of the unprotected buds came through the winter without injury. The covered trees blossomed two days latter and remained in bloom several days longer than the others. Some of the trees were uncovered at blossoming time and others later, one tree being left until nearly three weeks after blossoming. Fruit had set well under the cover except near the top, where the limbs were bound closely together. This method could only be employed with young trees.

Shading with canvas hay caps proved as effective as whitening or covering with corn stalks, but the expense would be too great except for young trees.

An experiment with board sheds built over the peach trees during two winters was very satisfactory as regards giving protection to the trees, but the expense puts that method of protection out of consideration.

THINNING FRUITS. Tests conducted at the Massachusetts station with thinning apple and plum trees showed a considerable gain in marketable fruit, and fewer windfalls when the trees were thinned than where they were left unthinned. A good profit was shown in the prices realized, after paying the expense of thinning. A very marked result from the test with plums was the decrease of brown rot in the case of the thinned fruit.

In experiments at other stations the results have been generally favorable to thinning. Fruit grading No. 1 have been considerably increased in number, and, in some instances, the total yield has been larger. The vitality of the trees has also been preserved. It is also believed that thinning regularly would cause trees to bear a fair crop every year.

In thinning, certain things must be considered It should be delayed until there is no danger of premature dropping of fruit from lack of pollination, from danger of frosts, or other accidental causes. It should be done, however, before the fruit becomes so large as to tax the tree. Plums should be thinned when half grown and before the pits harden; peaches. when the size of small hickory nuts, or when half an inch in diameter; apples when the size of hickory nuts to 1½ inches in diameter. The fruit should be left far enough apart so as not to touch each other, and it is often recommended to leave them from four to six inches apart.

Fruit should be thinned by hand, the wormy, diseased, and inferior fruits being removed. Mechanical devices for thinning are not recommended, since they do not discriminate between good and bad fruits, do not leave fruits well distributed, and often break off or injure the fruit spurs. It has been suggested that, since the same fruit spurs rarely produce fruit two years in succession, the fruit should be entirely removed from part of the spurs in order that they may produce fruit buds for the following year.

TOMATOES. At the West Virginia Station tomatoes pruned after the fruit is set produced a greater number of ripe fruits per plant up to September 1st than unpruned plants, but the total yield per plant for the whole season was less. Of the various methods of pruning tomatoes, the single stem method gave somewhat earlier and larger fruits, but lessened the total yield considerably. Tomatoes trained on racks gave a larger yield than on any other kind of trellis. The use of a straw mulch increased the yield of tomatoes and decreased the amount of rot, the average weight of fruit per plant being 14.6 lbs. in the case of the mulched plants, and 12.2 lbs. in the case of the plants unmulched, and the percentages of rot 0.97 and 1.88 respectively.

DISEASES.

POTATO SCAB. Investigations into potato scab have been carried on by a number of stations in order to ascertain the cause and a remedy therefor.

Soaking the seed tubers in a solution of corrosive sublimate before they were planted was found to greatly decrease, and in some instances entirely prevent, the appearance of scab on crops grown from such seed. The method of treatment recommended is to soak the thoroughly washed tubers for one and one-half hours in a solution of two and a quarter ounces of corrosive sublimate in fifteen gallons of water. It is best to dissolve the corrosive sublimate in two gallons of hot water and then dilute it to fifteen gallons. As the mixture is very poisonous, all the treated tubers should be planted and the solution remaining disposed of so that stock cannot get to it. Metallic vessels are corroded by it and, therefore, one of the best vessels for use would be a large tub or a barrel. The tubers should be washed first, then put in a bag of some coarse material, such as a coffee sack, and placed in the solution for the required time, after which they are dried, cut, and planted.

The Michigan Station reports that the entire cost of treatment of the tubers need not exceed two cents per bushel, and a clean product has been obtained when the potatoes were planted in soil not already infested with scab. In extensive trials, where treated seed tubers were used, the crop contained only 6.8 per cent. of the slightly scabby potatoes as compared with 60.1 per cent. of such where the seed was not treated. Longer soaking reduced the scab, but also reduced the yield of tubers. At the Indiana Station the product from the treated tubers contained only 8.25 per cent. of scab as compared with 78 per cent. from the untreated lots.

This station has also been investigating into the use of a solution of formalin or formic aldehyde, eight ounces in fifteen gallons of water, which proved efficient in reducing the scab. This solution is said to have all the advantages of corrosive sublimate without being poisonous. Further experiments are to be conducted during the present year to see if it proves superior to the corrosive sublimate solution.

An important factor to be considered in combatting potato scab is the fact that the fungus is able to live in the soil for a considerable number of years. On this account one crop of potatoes should not succeed another in soil where a scabby crop has been grown. Nor should beets, mangels, or turnips be sown after a scabby crop of potatoes, inasmuch as both the North Dakota and the Connecticut stations report that these roots are susceptible to the potato scab.

Experiments conducted at the Rhode Island and North Dakota stations indicate that acid soils restrain the development of the scab fungus, and that the addition of lime, ashes, barnyard manure, or other alkaline fertilizers to an acid soil tends to increase the development of scab in about the same proportion that the acidity of the soil is decreased.

At the New Jersey, Delaware, and Massachusetts stations experiments were carried on to test the effect of sulphur as a soil treatment for the prevention of scab. In New Jersey the cut tubers were rolled in sulphur, or sulphur was placed in the rows with them, and the amount of scab was greatly reduced. Potatoes planted in ground which had received 300 pounds of sulphur and the same amount of kainit per acre the previous year were almost free from scab. In Delaware, where the tubers were rolled in sulphur before being planted, the results showed a diminished amount of scab in the crop grown on land apparently free from fungus. At the Massachusetts Station the use of sulphur did not appear to favorably affect the crop. The use of the Bordeaux mixture in South Dakota reduced the growth of scab, but also reduced the yield of tubers.

CORN SMUT.—The damage done by corn smut to the corn crops in some of the corn-growing States of the Union is sometimes very considerable. No part of the plant escapes, although the common impression is that the ears and tassels are the parts mostly attacked. Investigations made in Ohio and Kansas show that the leaves and stalks are the worst affected. The loss is not only confined to the ears rejected but the plants attacked without any smut on the ear give a smaller yield than those not attacked.

Experiments conducted in Indiana, Germany, and elsewhere, show that the corn smut is quite unlike the smut of oats, wheat, barley, etc., in that it can secure entrance into the corn plant at any time while the tissues are actively growing, and when once it has secured entrance it sets up a local infection, the smut masses always reappearing within a comparatively short distance of the point of entrance.

LIFE HISTORY OF THE SPORES. The spores of the smut, which in mass make up the black powder, do not, as a rule, directly infect the corn. They grow readily in liquid manure, moist dung heaps and damp, well-manured soil, but sprout very poorly in water. After germinating, the spore sends up a short, greatly branched stem, bearing at the ends of the branches chains of minute bead-like bodies, called conidia. It is through the agency of these that most, if not all, of the infection takes place. When some of these conidia alight on a portion of the corn plant that is actively growing, they soon germinate, especially if moisture from dew or rain is present, and penetrate the cell walls of the plant. Once they gain entrance their growth is very rapid, and in about three weeks smut boils may be seen. Spores from these new masses finding a suitable location, usually the ground, germinate, form their conidia, and are ready to infect some other portion of the plant, so that during the growing season there may be several distinct infections of the same plant. The presence ot corn smut in a field may be due to its being in the manure, especially if the manure is fresh, and from animals that haye eaten smut. The spores retain their vitality for a long time.

Prevention of Corn Smut. Owing to the fact that the fungus of corn smut is unlike other grain smuts in its life history, it cannot be prevented by treating the corn seed before sowing. Spraying does indeed check it, but the treatment is too expensive. The simplest and most effective way seems to be to collect and burn the smut masses as soon as they are noticed and before they ripen and scatter their spores. This could be done when the corn was being cultivated and at the harvesting of the crop.

Corn Smut not Injurious to Cattle. The idea is still widespread that the eating of corn smut by cattle is injurious to them. Experiments conducted several years ago, however, by the Bureau of Animal Industry of the United States Department of Agriculture showed that no evil results were found from feeding it to heifers. The Michigan Station have lately experimented on the same line with cows in different stages of the milking period. Two cows were fed all they would eat, the amount being gradually raised from two ounces to eleven pounds per day, this latter quantity being more than they could get if foraging over a corn field after the crop was removed, or from corn fed to them in the stable. At the beginning of the test the cows ate the smut very readily, and the two which received it in moderate quantities preferred it to the grain ration up to the close of the test. The cows which received the larger amounts did not eat the smut so readily, though they never entirely rejected it. The test lasted forty-nine days. During the last half of the test the dung of the cows fed smut was darker in color than normal. No signs of abortion appeared in the pregnant cows, and the milk yield of the cows in milk was regular and constant.

An analysis of the corn smut showed that it contained considerable nutritive material. In composition it resembled the coarse fodders rather than concentrated feeding stuffs. The ash of the corn smut was found to be rich in phosphates of potash and magnesia, like the ash of grain. No poisonous alkaloids were found in the smut. In this respect it differs from ergot, the smut on rye, which possesses such dangerous qualities.

Club Root of Turnips. A good deal of difficulty is experienced in some parts of the country with club root of turnips. Investigations at the New Jersey Station indicate that the most efficient method of prevention is to use unslaked lime or gas lime on the land to be sown to turnips. It was shown that the fungus of club root can remain active in the soil for at least two years, and that manure is a means of carrying infection to the soil. Cabbage grown on "clubby" land was seriously infected with the disease. It was also found that a number of plants allied to the turnip were liable to be infected with club root. Of these Charlock, or wild mustard, and white mustard were the most susceptible to the fungus.

Smut in Wheat, Oats and Barley. At the North Dakota Station the corrosive sublimate treatment of the seed grain has been found most effective for the prevention of the stinking smut in wheat. With oats this treatment has not been successful, but the use of hot water was very satisfactory. Potassium sulphide gave good results for barley but was not successful when used on oats. Formalin gave very promising results with oats

Plant Lice. The New York Station has issued a very instructive bulletin, No. 139, on the subject of plant lice, showing the amount of damage done by these insects to plants, small fruits, etc., with a number of instructive plates of the lice and their parasites in various stages of growth. Among the insecticides recommended for their destruction is good whale oil soap. On pound of the soap to seven gallons of water will kill plum and currant lice. The kerosene emulsion, kerosene-water mixture and tobacco solutions are also good.

BLACK KNOT. As a result of the use of spraying the plum trees at the Massachusetts Station with fungicides scarcely a specimen of black knot can be found on any of the trees, although no knots have been removed for about a year.

ENTOMOLOGY.

BEES TRAVELLING. In referring to the question of how far bees travel for honey, C. P. Dadant, in the American Bee Journal, says, "Whatever other people's bees may do, ours will not thrive on a honey-crop source located two miles or more from them."

In regard to shipping bees a long distance the same authority states that bees do not require water on the journey. In his experience bees that had been supplied with water either in comb cells or sprayed over the comb arrived dead, while those that had been supplied with honey arrived in good condition. The explanation given is that there is sufficient moisture arising from the respiration of the bees to aid them in liquefying the candied honey supplied them.

PREVENTING BEES SWARMING. In the American Bee Journal W. P. Taylor claims that simply raising the hive about half an inch, so as to allow the cold air to enter the brood chamber more freely, is a sure cure for swarming. He believes that the cause of swarming is the overcrowding of some apartment of the queen's chamber.

SWARMING BOX FOR BEES. A. H. Huff, in the American Agriculturist, describes a swarming box for bees. It is an ordinary 10x12 inch square box at the end of a pole, with a little honey in it as bait. Small holes bored in it allow circulation of air. When a swarm settles, the box is pushed up over the cluster.

THE CODLING MOTH. A most interesting and instructive bulletin on the Codling Moth has been issued by the Cornell Station, which brings up to date all the information obtainable as to the life history of this destructive pest, and the best way to prevent its ravages

A careful study of this insect has been going on for two years at the Station, which has brought to light some new facts. The first is that the egg of the Codling Moth is not laid in the blossom of the apple, but, as a rule, on the side near the stem and sometimes on the leaves of the branches. The prevalent idea hitherto held by investigators that the egg was laid in the blossom was owing to the fact that in the majority of cases the worm on emerging from the egg began to tunnel from the blossom end of the fruit. The Cornell Station has now ascertained that the egg is laid some days after the blossoms have dropped—in fact, when the apples are about an inch in diameter.

How it Starts on its Work. A few hours after it is hatched, the worm starts on its work to reach the core, which it does in about a week's time. As mentioned above, the majority start at the blossom end, making their first meal there, and this, as we shall see, gives the fruit-grower an important advantage in his efforts to destroy it. The worm usually spends from twenty to thirty days of its life feeding inside the fruit. Usually it gets its growth in the same fruit where it got its first meal. Occasionally more than one worm has been found in a single apple. When this occurs it may be that they are of different broods.

How they leave the Fruit. Just before they are ready to leave the fruit they burrow out a passage way to the exterior, usually by the shortest route. When they reach the surface of the apple they throw out their excrement and then temporarily block up the door until they are ready to depart. They generally leave at night.

If the fruit has already fallen to the ground, the caterpiller crawls to some hiding place in which to begin its preparations for becoming a moth. The worms which leave the fruit on the tree either let themselves down by a silken thread or simply crawl down the branch to the trunk or into a crotch of the tree where they crawl into any crevice they can find. Others get into piles of rubbish, or fences, and, in fact, almost anywhere except in the ground or grass. Having found a suitable place, the caterpillar first usually hollows out with its jaws a little oval cavity, and then begins its cocoon. Usually when the cocoon is made, during or after August, the insect may be found therein as a caterpillar until the next spring. If the cocoon is made before August 1st, the caterpillar may change within three days into a pupa. The insect generally spends but two or three weeks, sometimes less, in the pupa state, whether the change to a pupa takes place in July or not until the next spring.

The time when the worm goes into the cocoon is regulated by the earliness or otherwise of the season. When spring opens early insect life is developed early, and the moth lays its eggs in advance of the usual time. The caterpillar thus goes into the cocoon sufficiently early to enable it to become a moth again the same season. This second brood of the codling moth are usually very destructive to the apple crop. Further south and in some of the European countries there is always a second brood and occasionally a third one. The worms of these later broods enter the apple at any point, feeding for some time in the flesh just beneath the skin where they enter, forming there a shallow mine which greatly disfigures the apple.

Spraying for the Codling Moth. Of all the remedies proposed for the destruction of the Codling Moth, and there have been several, nothing has proved so effective as spraying with Paris green and Bordeaux mixture. When these poisons are used in combination they kill the caterpillar of the codling moth and also destroy the apple scab fungus. It was when experimenting with these that the Cornell Station discovered the reason why the codling moth is not so easily reached on pears as on apples. About a week after the petals fall off the apples, the calyx lobes begin to draw together, while those of pears draw together but slightly. When spraying is done just before this happens, some of the poison lodges in the open calyx cup, and when no rain follows to wash it out it remains there while the calyx lobes close up and protect it from the weather. When the young apple worm a week or so later comes to get its first meal off the lobes and blossom end of the apple, it swallows the poison and dies, As the calyx lobes of the pear do not draw together any poison deposited by the spray pump therein it gets washed away by rain or blown out by winds and so its intended victim escapes it.

It is unanimously concluded by experimenters that two sprayings are sufficient for the Codling Moth, one just after the petals fall and the second a week later. The cost of spraying per tree will not exceed from five to ten cents, depending on facilities, quantity of rain storms, etc.

NO DANGER TO STOCK FROM PASTURING UNDER SPRAYED TREES. Experiments carried on in Michigan by Prof. Cook show that there is no danger of stock being poisoned when pastured in orchards that have been sprayed. All the grass under sprayed trees was cut and fed to his horse with no ill results. Three sheep were put in a pen under a sprayed tree when hungry and ate up all the grass with no injurious results. This experiment was twice repeated with the same result. Paper was spread under trees and the amount of arsenic on it analyzed by the chemist who found that in one case it amounted to only .4 of a grain and in the other to 2.2 grains.

FIGHTING CUTWORMS IN ONION FIELDS. In experiments at the New York State Station with fighting cutworms in onion fields it was found that the bait method, using dry bran or middlings, or equal parts of both mixed with Paris green, was the most effective. This bait should be sown on the grass and weeds along the ditches bordering the onion beds, and also in drills in the field.

SOME CHEMICAL POINTS IN THE PREPARATION OF INSECTICIDES AND FUNGICIDES. The *Agricultural Gazette* of New South Wales contains some remarks by F. B. Guthrie on the preparation of insecticides and fungicides. In making the Bordeaux ixture the lime water should be poured into the copper solution and not the latter into the former. The lime should be fresh. Free copper sulphate, even in small quantities, burns the foliage and should not be allowed to be present.

The bluestone is sometimes impure owing to the presence of sulphate of iron. Iron vessels should not be used for this mixture; wooden ones are preferable.

In making a lime, salt and sulphur wash, the sulphur may be thoroughly incorporated by first grinding it up into a paste with a small quantity of water. The best vesse for boiling the mixture is an enamelled one.

In speaking of the kerosene emulsion, he says that free oil is injurious to foliage and India rubber; hence the spraying apparatus should be washed out with hot water after use.

MOSQUITOES. The Minnesota Station has been investigating the fecundity of the mosquito. On July 6th the water in a barrel of rain water was filtered and found to contain 35 grams of mosquitoes, which by actual count was the weight of 7,595 larvæ and pupæ. Besides these there were 32 egg masses which would produce about 9,664 mosquitoes, or a total of 17,259 in one barrel. The other barrel examined July 22nd, contained 19,110 mosquitoes.

FEEDS AND FEEDING.

FEEDING MILLET TO HORSES. The injurious effects of feeding millet to horses in the place of hay is well illustrated by investigations made at the North Dakota Station. Two geldings were first experimented with. Millet was substituted for hay for about ten days. Symptons of lameness and suppression of urine were observed.

The second test was made with two mares. One of the mares became very lame and could hardly stand, and suffered from time to time from retention of the urine. She was killed and examination of the carcass showed a very diseased condition. The other mare did not show such marked symptons during the test, but when fed millet for about three months she became so lame in the joints of her hind legs that she could hardly walk. When feeding millet was discontinued she recovered, but the symptons all returned when the feed was again changed to millet. After two years of alternate hay and millet feeding she became practically worthless.

These experiments were confirmed by the experience of many farmers. Millet fed to horses produces an increased action of the kidneys, and causes lameness and swelling of the joints. It causes an infusion of blood into the joints, and destroys the texture of the bone, rendering it soft and less tenacious, so that the ligaments and muscles are easily torn loose. The bad effects were observed whether the crop was cut just before the heads were fully ripe or earlier.

FEEDING SEPARATOR MILK TO CALVES. C. F. Curtiss of the Iowa Station gives the result of experiments carried on to test the comparative values of linseed meal, oatmeal, corn meal and flaxseed, and corn meal fed with separated milk, to three lots of calves. Each lot of four calves received about 3,760 lbs. of skim milk and 1,480 lbs. of hay, durthe 74 days of the test. In addition, lot one was fed 429 lbs. of linseed meal; lot two, 605 lbs. of oatmeal; lot three, 59 lb. of flaxseed and 538 lbs. of corn meal; and lot four, 601 lbs. of corn meal.

The best results were shown by those fed corn meal and milk. Those fed oatmeal and milk came next, those fed flaxseed and corn meal with milk were third in order of gain, and those fed linseed meal and milk were last. This confirms previous experiments carried out at this station.

RAISING CATTLE WITHOUT COARSE FEED. At the Illinois Station a study was made of the effect of feeding a ration containing no coarse fodder to four calves. A grade Shorthorn was fed at first large quantities of milk, and later on a grain ration of corn and oats in the proportion of 1.1. When about five months old the calf consumed half a bushel of grain daily. Though large amounts of food were consumed the calf always seemed hungry. When about four months old its joints began to swell and the legs to stiffen. When it was five months old disturbances of the nerve centres appeared and the calf was killed, since it was evident that it could not live much longer.

A Shorthorn Friesian-Jersey was for seven months on skim milk alone. For some time its appetite was abnormally large and it was not satisfied with 50 lbs. of skim milk daily. Later on it lost its appetite, its legs became stiff, and it was plain that it could not live if the diet given were continued. Straw was, therefore, given it, which it ate greedily. Three hours after taking the straw it chewed its cud for the first time and soon recovered its health.

A grade Jersey was fed milk at first and later on some grain, at one time consuming more than 70 lbs. of milk daily. Later on its appetite diminished and the calf was quite indifferent to food. It was then given hay and rapidly recovered its normal condition.

The fourth case was a grade Jersey which had a diet of milk and grain and afterwards grain alone. When about three months old the calf died.

The calves gained in weight throughout but always looked poor. Calf No. 2 gained 138 lbs. in the first 100 days of the test. None of them chewed the cud, although large quantities of grain were fed to three of them. Post mortem examinations of Nos. 1 and 4 showed that there was no visible fat on the carcass, though the muscular tissue was firm and hard.

Steer and Heifer Beef. The Iowa Station has been continuing its investigation into the comparative values of steer, open heifer and spayed heifer beef. As is well known, American buyers discriminate against heifers when buying fat cattle, whilst in England heifer beef has a higher rating.

In this second experiment the heifers made a slightly greater average gain from correspondingly less food and at a less cost than the steers. The block test did not reveal any material difference in the character, composition or quality of meat from steers and heifers, but the percentage of high priced cuts, ribs and loins was greater in both lots of heifers than in the steers.

It was observed in this and other investigations that, under similar conditions, heifers are inclined to take on flesh a little more readily than steers. Larger gains by the heifers may not be shown, but there is a tendency to finish at a little earlier stage in fattening.

The fact is brought out that heifer beef has been very much underestimated, since in both trials the heifers returned a higher net profit on the block than the steers, even when granting the higher valuation put on the leading cuts from the steers. Spaying, apparently, was of no particular benefit as regards the gains made.

Influence of Breeding on the Feeding Qualities of Lambs. This was well brought out in an experiment by Prof. Craig in 1896 at the Wisconsin Station. A number of lambs of indifferent breeding were bought and pitted against an average lot of wethers selected from the station flock. Both were fed a ration of corn and peas in equal quantities, with corn fodder at their will. The average weight of the purchased lambs at the beginning of the test was 75.5 pounds, and of the station ones 115.9 pounds. The purchased lambs made a daily gain of .32 pounds at a cost per pound of gain of 4.58 cents. The station lambs gained .51 pounds a day at a cost of per pound of gain of 4 08 cents, their gain being nearly twice as much as that of the others. They ate more food and the gains were more cheaply made. The profit per head on the purchased lambs was sixty-five cents, and on the station lambs $1.13.

Feeding Grain to Lambs Before Weaning. Three tests have now been held at the Wisconsin Station to determine the respective values of different grain foods fed to lambs before they are weaned. In the first experiment ground corn, bran and oats were the rations given. In this test the corn meal gave the best returns. In the second trial cracked peas were added to the list of foods given. Six lambs were fed ground corn, six whole oats, six bran and six cracked peas. Here again ground corn was found to be the cheapest food, with bran next, then oats, while cracked peas were the most expensive. Similar rations were given the lambs in the third experiment, which extended over ten weeks. Once more ground corn proved the cheapest food, the lambs making the largest gain on it at the least cost. There was not much difference between oats and bran, although oats were slightly the cheaper feed.

The average for the three trials showing the cost of grain for one hundred pounds of gain was as follows: ground corn thirty-one cents; bran thirty-seven cents; oats fifty-one cents; and cracked peas fifty-one cents.

It was also found that ground corn was the cheapest food for lambs after they were weaned, although those fed corn with a mixture of peas made slightly better gains and ate more grain than the others. As the lambs grew older they relished the corn and peas better, and there was less sickness among the lambs fed on this ration than among those fed ground corn only. The cost of the grain ration, however, is considerably increased by the addition of peas.

LAMBS FOR THE EARLY SPRING MARKET. This exceedingly important subject has been receiving a good deal of attention at the Wisconsin Station of late years. It was found that the characteristics which the Dorset ewes possessed of taking the ram at any season could be transmitted to ordinary ewes through the ram. The first cross ewe from a native ewe and a Dorset ram bred much earlier in the season than those of other breeding, and the second cross of the Dorset on the first cross was more certain to take the ram early in the season. This having been ascertained, the establishment of a flock of grade Dorsets was undertaken for the sole purpose of producing early lambs with the greatest degree of certainty and profit. The result has been very encouraging

The ram was allowed to run with the ewes and a very small amount of grain, just enough to keep them in a thrifty condition, was fed to them. The first lamb was dropped on September 20th, and the majority during January and the first few days of February. The lambs were all sold in the local market, mostly in April, and brought six cents per pound, the Chicago price for such at the same time being eleven cents. The expense of shipping so few, however, prevented the station taking advantage of the higher price

The advantages of having lambs dropped in the fall is that the breeder can secure the highest spring prices, while his lambs will also have attained weights that are commonly only reached in the fall. The heaviest lamb in the above experiment weighed 120 pounds. As stated above, while a good degree of success was attained from first cross ewes, a greater certainty of breeding early exists when the ewes are the second cross of the Dorset on native sheep

ESTABLISHING A FLOCK OF MUTTON SHEEP. The following important principles, which should be thoughtfully considered by all sheep breeders, are given by Prof. Craig in the Wisconsin Station annual report for 1897:

The Ram. It is a profitable policy to put as much value as possible in the ram. An active and impressive ram, properly treated, will beget at least 300 lambs, so that it does not take a good $100 ram long to make up the first difference in cost between him and one at $50.00, that is only half as good. A greater mistake cannot be made than to buy a highly-fitted prize winner, no matter what the price may be. They almost invariably prove infertile or incapable of service. While it is hardly possible to injure a lamb by too liberal feeding, provided exercise to an unlimited extent is given, yet highly fitted yearlings and those of more mature age are practically worthless in the breeding flock. High priced rams give a good value when they are vigorous without having been pampered or starved, and most certainly do they do so when they have the merit that attracts higher prices in the ordinary way of business.

The Ewes. Select ewes that are the deepest milkers, that suckle their lambs best, and have the densest fleeces for their own protection. To secure heavy weights in the lambs, and have them show the smooth appearance of coat and form which indicates thrift, the ewes should be free milkers Even if an ewe is not so nicely rounded in form as she might be, if she is a good milker she deserves the premier position in the flock. The thinnest ewes at weaning time are, invariably, the best mothers. Ewes vary considerably in respect of the quality of the lambs they rear from year to year, so that a ewe should not be discarded on one year's record.

The feeding of the ewe lambs to replenish the flock should be liberal in every sense of the word. Feed them liberally on oats and the best pasturage possible, and you will be surprised how well they will grow for the first nine months of their lives. It is shown in the size and weight of the fleece, and if they have been liberally fed during the first year, it is hardly possible to check their growth afterwards.

Keep uniformity in view. When a butcher buys your lambs, this counts for something. To secure this, a flockmaster should never dispose of a ram that has proved himself a valuable breeder, as well as a getter of superior lambs. He should be bred to the same ewes year after year as long as it is possible to do so. When a new ram is chosen to mate with the get of the other, look for those qualities that are absent in the ewes to be bred to him. It is by balanced breeding that the greatest progress is made.

Silage for Hogs. Two tests to study the value of silage as a maintenance ration were made at the Virginia Station. The first was made with two lots of sows. Those in lot one were fed seventeen and a half and fourteen pounds per week, respectively, of corn on the cob. Those in lot two were fed fifty-six and forty-nine pounds of silage per week, respectively. During the seven weeks of the test lot one lost 3.5 pounds, and lot two twenty-seven pounds. The pigs were in poor condition at the close of the test. In the second test a boar and sow were each fed about twenty-one pounds of corn on the cob and thirty-five pounds of silage per week ; another sow was fed fourteen pounds of corn on the cob and twenty-eight pounds of silage. During the ten weeks of the test the boar lost eighteen pounds, and the sow, fed on the same ration, lost six pounds, while the sow fed the smaller ration gained thirteen pounds. The pigs appeared in good condition. The conclusions reached are that silage is an economical food to use in conjunction with corn as a maintenance ration, but not so if used alone.

Rape for Swine. In an experiment of seventy-six days at the Wisconsin Station as to the fattening qualities of rape when fed to swine, twenty pigs were divided into two lots. Those in lot one were folded in the rape, and those in lot two were kept in pens and fed the same kind of grain as those in lot one, both lots getting all they would eat. Those given the rape were fed lightly on grain at first until they began eating the rape. They had no pasture in connection, but were given pieces of fresh rape about every third day. The aim was to contrast grain-feeding in pens with grain-feeding on rape. The pigs in lot one consumed 1,386 pounds of corn and 690 pounds of shorts, and ate about one third of an acre of rape. Those in lot two consumed 2,096 pounds of corn and 1,042 pounds of shorts. Their gain was 857 pounds, and that of lot one, 853 pounds. The rape fed thus saved 710 pounds of corn and 352 pounds of shorts, or 1,062 pounds of grain in all. An acre of rape was thus equivalent to 3,318 pounds of grain.

Another experiment in 1896 on similar lines gave a difference in favor of the rape-fed pigs of 1,330.2 pounds less grain consumed.

Rape for Sheep and Swine. The rape crop, its growth and value for soiling and fattening sheep and swine, is the subject of a bulletin from the Wisconsin Station by Prof Craig. The results of experiments in fattening lambs on rape show an average gain per head, weekly, of two and a half pounds, when one pound of grain per head, daily, was fed with the rape. This would mean a production of 400 pounds, at least, of mutton from an acre of rape in one month, if forty lambs were fed some pasture and one pound of grain per head, daily, as well.

Two tests of feeding rape to pigs were conducted. The first trial was made with two lots of ten pigs each. One lot was fed in a pen a ration of corn and shorts in the proportion of 2 : 1. The corn was soaked and mixed with bran in a slop. The other lot received a less amount of a similar grain ration, and, in addition, were allowed the run of a thirty-two hundredths acre field of rape. In seventy-six days the ten pigs on rape consumed 1,386 pounds of corn and 690 pounds of shorts and gained 853 pounds. The lot fed in a pen consumed 2,096 pounds of corn and 1,042 pounds of shorts and gained 857 pounds. The gains were thus practically the same in either case. In other words, the rape on thirty-two hundredths of an acre was equivalent to 1,062 pounds of grain.

The second trial was made with two lots of nineteen pigs each. The grain ration and conditions were the same as in the previous test, but the lot on rape had a larger run, viz , six-tenths of an acre. In forty-nine days this lot consumed 2,220.3 pounds of corn and 1,109 pounds of shorts and gained 1,066 pounds. The lot fed grain only consumed 3,106.5 pounds of corn and 1,553 pounds of shorts and gained 1,076 pounds. In this test also the gains of the two lots were practically the same. The rape from six-tenths of an acre was equivalent to 2,217 pounds of grain. Taking the average of two trials, one acre of rape equalled in feeding value 2,767 pounds of grain fed.

The author states that rape is likely to be as valuable for swine as for sheep, although the former have sometimes to be educated to the taste of it. There is less risk in feeding it to swine as they do not bloat on it nor scour if fed properly, while it promises to be an excellent crop for pasturing brood sows and young pigs. It seems especially valuable for swine-feeding during the hot summer months.

Feeding Tests with Barley. In an experiment with feeding pigs on barley, on wheat and corn, on barley fed alone and with corn, and on bald barley, at the Colorado Station, the most rapid gains were made with ground bald barley. The feeding value of ground corn and ground common barley was about the same, with the advantage slightly in favor of the barley. A pound of grain required one-half more ground corn than ground barley, and one-third more ground common barley than ground bald barley. Ground common barley and ground corn fed together gave better results than the same grains fed separately.

In a test with sheep, wheat and common barley gave practically the same results as did common barley and corn, with a slight difference in favor of the corn. In the case of the sheep, barley and corn fed separately gave somewhat better results than when fed together.

Cost of Feeding Pigs Before and After Weaning. It was found at the Wisconsin Station that pigs when fed with the sow before weaning made more economical gains than the same pigs did after weaning, the difference in favor of the former method being 20 per cent. It took 237 pounds of grain, half cornmeal and half shorts, together with 475 pounds of creamery separator skim milk to produce 100 pounds of gain with a sow and pigs before weaning, while the same pigs after weaning required 288 pounds of meal and 576 pounds of milk. This shows the value of feeding the young pigs through the sow.

Whole Corn *versus* Cornmeal for Hogs. Two tests carried on at the Wisconsin Station to compare the relative value of whole corn and cornmeal when fed to pigs, brought out the fact that there was a considerable saving in grinding the corn, amounting in some cases to eight per cent. Shorts were fed to both lots of pigs in the experiments.

Composition of Milk. Investigations at the Wisconsin Station into the composition of sows' milk, gives the following averages for seven sows: Water, 80.96 per cent.; fat, 7.06 per cent.; casein and albumen, 6.20 per cent.; milk sugar, 4.75 per cent.; ash, 1.07 per cent.; solids not fat, 11.99 per cent.

Examinations of seventeen samples of sows' milk in Germany gave an average of fat of 7.56 per cent. Other analyses have shown the fat content as high as 8.7 per cent. These investigations confirm previous observations as to the richness of sows' milk.

Value of Dairy By-products in Pig Feeding. The Utah Station gives a preliminary report on the value of skim milk as tested with three lots of three pigs each. Lot one was fed skim milk and chopped wheat in the proportion of 5:1 until the pigs averaged 75 lbs., then in the proportion of 3:1 ; lot two received all the skim milk they would take, and lot three were fed chopped wheat mixed with water. The milk was fed fresh or sour. Lot one and lot two received some whey with the skim milk. The test lasted 100 days. The gain per day for each hog fed on milk and grain was 2 54 times greater than those fed on milk alone and 1.7 times greater than those fed on grain alone. The value of skim milk was 75 per cent. greater when fed in combination than when fed alone.

THE FEEDING VALUE OF CORN STOVER. J. B. Lindsey, in the year book of the U. S. Department of Agriculture, gives the following information as to the value, composition and digestibility of corn stover, with suggestions as to feeding it:

1. Both chemical analysis and digestion experiments show that corn stover contains fully as many pounds of actual food materials as equal quantities of the best grades of hay.

2. The blades, husks and stalks are all valuable food; hence the entire plant should be cut when the corn is ripe, carefully cured and housed.

3· One third to one-half of the stover is very often wasted by improper methods of treatment and feeding.

4. In order that it may be eaten clean, corn stover should be cut fine or shredded before being fed.

5. Stover very frequently lacks in flavor and is a one-sided or carbonaceous feed; hence it should not be fed alone.

6. Only about one-half of the total coarse fodder of the ration should consist of stover. It should also be fed in combination with by-products rich in protein.

7. The palatability of stover can be improved by moistening it with water and sprinkling with bran. Steaming very much improves the mixture.

PRESERVATION OF EGGS. In the United States Consular Reports for 1897 is given the result of tests in Germany of twenty methods of preserving eggs. The most satisfactory methods were found to be varnishing the eggs with vaseline and preserving them in lime water or a solution of water glass. The latter is stated to be the most preferable since varnishing the eggs with vaseline takes considerable time and treating them with lime water is likely to give them a disagreeable taste and odor. There is, however, one drawback with eggs preserved in a solution of water glass, viz., that the shell bursts easily when in boiling water. This, however, can be prevented by cautiously piercing the shell with a strong needle.

FEEDING EXPERIMENTS WITH CHICKENS. A test was made at the North Dakota Station to determine whether heating a poultry house diminished the cost of feeding and increased the egg production. Forty-six chickens were confined in an unwarmed poultry house from December 1st until January 20th. At the beginning of the test they were fed five pounds of table scraps in the morning and two pounds of wheat screenings at night. Afterwards the ration was increased until they consumed eleven and three-quarter pounds of scraps in the morning and eleven and a half pounds of wheat screenings in the evening.

From January 20th to March 31st the poultry house was heated by a stove. At the end of January only six pounds of scraps were consumed in the morning and eight and three quarter pounds of screenings in the evening. At the close of the test the morning ration consisted of four and a half pounds of table scraps, and the evening ration of four and three-quarter pounds of wheat screenings. The total cost of feed was $4.50.

During January, before artificial heat was begun, the average number of eggs laid was two and three-quarters per day, while during the remainder of the month the average was six and three elevenths. That is to say, when the poultry house was heated only about half as much food was consumed and yet the egg production was more than doubled. With eggs at twenty-five cents a dozen and food at the usual price, heating the poultry house proved profitable.

Poultry Experiments. Experiments made at the Massachusetts Station to test the effect upon egg production of condition powders showed that not only did no benefit result therefrom but the number of eggs laid by the hens receiving the powder was less and the cost of food per egg considerably more. A test at the same station as to the comparative merits of animal meal and cut bone for egg production indicated a decided advantage in favor of cut bone.

Raising Geese for Profit. Farmers' Bulletin No. 65 of the United States Department of Agriculture contains a summary of the work of the Rhode Island Station during the last few years in testing the comparative merits of various breeds and crosses of geese. Among those tested were Embden-Brown China, Embden-Toulouse, Brown China, Embden-African, Toulouse-Brown China, Embden-White China, African-Brown China, African-Toulouse, Pure African, Pure Embden, and Prince Edward Island.

The Embden-White China were the easiest to pick, were white when dressed, and, though small, were plump and attractive looking. The Embden-African were also easy to pick and were large and plump. The White China, though the weakest and smallest of all breeds, yet when mated with Embden ganders produced vigorous, quick growing goslings, which were plump and solid when dressed. The Embden-Toulouse is considered the most satisfactory cross for large geese for the Christmas and New Year trade. Pure African and Embden and the African crosses grow best early in the season and should be marketed early, Pure-bred China, African-Toulouse, and African-Brown China should be dressed before fall as they are then easier to pick. White-plumaged Embden and white crosses may be picked easily and later than the others.

Old geese lay a greater number of larger eggs and are more reliable than young ones, but time is often saved by buying young geese rather than trying to secure any number of old ones. Young ganders are better for breeding than young geese. Young geese lay more fertile eggs and produce more goslings the second season than the first, and, if they are not changed about often from place to place, breed best the third season.

Geese for breeding should be obtained as early in the fall as possible, in order that they may get acquainted with their new surroundings before the breeding season. They should have plenty of exercise and be kept moderately thin through the winter by light feeding and given a free range or facilities for swimming. The best ganders for breeding purposes are African and Brown China. Toulouse geese lay well but often do not sit. Embden geese lay fewer eggs but are better mothers. Brown China and White China geese are prolific layers. Geese are graziers and two much grain is not good for them. To insure fertile eggs they should have plenty of green food and access to a pond or stream. If this is not possible, a tub of water set level with the surface of the ground will do. Very early laying is not desirable, since the goslings will not do well unless they get plenty of grass. For the first two or three days the goslings should get nothing but grass and water. After that a light feed of scalded cracked corn should be given in addition three times a day. As the goslings are liable to be overcome by the heat, a shady place should be provided where they can retire at will. When the eggs of geese are hatched under hens, the goslings should be taken away immediately after hatching and put in a brooder for a short time.

VETERINARY SCIENCE.

Tuberculosis. The varying degrees to which different grades or classes of animals are affected by tuberculosis has recently been brought out by investigations at the Minnesota Station, where, out of 13,366 animals subjected to the tuberculin test, native animals were found diseased to the extent of 7.8 per cent., high grade animals 10.8 per cent., pure breds 16.6 per cent., farm herds 14.2 per cent. (omitting 55 animals from two herd, 7.8 per cent.), and city dairies 10.4 per cent. The investigations also showed that stable conditions were very important. Under good stable conditions 10.1 per cent. (omitting 55 animals in two herds, 6.8 per cent.) were affected; under fair conditions of stable 7.28 per cent., and under poor conditions of stable 19.1 per cent. Similar results were obtained by comparison with respect to the ventilation of stables, 9.5 per cent. (omitting 55 animals in two herds, 5 per cent.) being affected in well-ventilated, 6.16 in fairly well ventilated, and 16 6 per cent. in poorly ventilated buildings.

These results are pretty much what the laws of health would lead us to expect; but the existence of two badly infected herds, where the conditions were most favorable to health, shows that the disease may prevail even where a considerable amount of care is taken in the way of ventilation and general sanitary condition of buildings. Such a prevalence of the disease was no doubt due to the introduction of diseased animals, probably with the idea of improving the herd.

Steers and bulls are less subject to tuberculosis than cows, and calves less than older animals. It is generally recognized that newly-born animals are only rarely affected with tuberculosis.

Of 27 calves from tuberculosis cows in Minnesota one died soon after birth and was found to be tuberculous. Two others, one fed by sucking its dam and the other on sterilized milk, became tuberculous. The rest were raised on milk from tested cows and upon sterilized milk, and at the end of the experiment were, as shown by tuberculin test, in a sound condition. This gives a little over 11 per cent. of tuberculous calves from tuberculous dams, and only in one case, or a little over 3.7 per cent., was there evidence of infection before birth.

In European experiments, of 67 calves from tuberculous dams fed on milk of untested cows, nearly 40 per cent. became tuberculous, while of 109 fed on milk of tested cows, less than 19 per cent. became infected.

MILK FEVER. The following method of prevention and treatmen of milk fever is the result of enquiries and investigations by the New Jersey Station:

Treatment should begin a week or two before the calf is expected, and should be practised on every cow whose condition is conducive to milk fever. The treatment should be continued for a week after calving. Begin giving short rations, feed sparingly of rich food, such as grains and clover, rather give apples and bran mash. Give salt to provoke thirst, and encourage the cow to drink by warming the water if it is cold. Epsom salts, a pound to the quart of water, may be given once or even twice a week, to provoke activity of the bowels and counteract constipation. If the udder is distended it should be rubbed and milked regularly. The cow should be kept in a dry, clean place, airy and cool in summer and warm in winter, and away from the other animals. Should the owner fear that his method has not reduced the blood sufficiently, a veterinarian should be called in to let out several quarts of blood from tht jugular vein of the neck. Just before calving the vagina should be washed out with a generous injection of two per cent. creolin solution, which should be repeated daily after calving for a few days. Immediately after calving the veterinarian should inject creolin solution into the uterus, as in cases of abortion. Carbolic acid, corrosive sublimate, or iodoform can be used liberally on the soiled bedding and floors, but not for disinfecting the genital passages.

As soon as a cow shows symptoms of milk fever, a veterinarian should be called, who will determine from the symptoms whether it is advisable to bleed or not, to apply the wet-pack or not, to administer medicine through the mouth or by injection, and what medicine had best be given. If the cow is down, she should be propped up on the brisket to prevent food running into the lungs from the stomach. The following drugs are useful to be kept on hand when there is danger of milk fever: Epsom salts, creolin, linseed oil, sulphate of soda, ammonia, turpentine, extract of ergot, mustard, morphine, strychnine, tincture of aconite, aloes, ether, and nux vomica.

GARGET. There are several kinds of garget, varying from simple congestion due to over-accumulation of milk, to tubercular garget and inflammation of the membranes and substance of the udder caused by bacteria.

In response to circulars sent by the New Jersey Station to 70 dairymen in the State, 47 gave their method of treatment, of which the following is a summary:

First of all fomentations of hot water or vinegar (or better, witch hazel extract, according to one) continuous and repeated, should be applied, followed by annointing and rubbing the udder with linseed oil, soap and belladonna, or vaseline (camphorated) and iodine. The milk should be drawn as far as possible, even if a siphon has to be used. A poultice of linseed, or bran or hops, held up by oiled cloth, having holes cut in it for the protrusion of the teats, and thoroughly fastened by straps over the back and passing between the legs behind, may be useful in some cases, but the poultice should be removed before becoming dry, and the udder should not be exposed to chills between times. If the cow has much fever, administer saltpeter 1 ounce, aconite 15 drops, in one pint of water, every four hours, and a wet-pack may in rare instances be indicated. But it should always be used with great care. After all the milk is drawn, a one per cent. creolin solution or one one thousandth corrosive sublimate solution may be injected into the teat and forced up until the gland has taken all it will receive. Then milk out. A weaker solution in pure water may be left in longer, but, unless the water is sterile, it should not be injected. When applying the siphon thus, it should be disinfected before insertion.

ABORTION. The New Jersey Station, in the Annual Report for 1897, give considerable attention to the causes, prevalence, symptoms, methods of treatment, and prevention of abortion, from which the college herd had suffered during the previous summer.

It is now established that the primary cause of abortion is a germ. These germs are small bacilli which multiply best where the oxygen pressure is much less than it is in ordinary pure air, but, strange to say, they will grow when the oxygen pressure is much greater than in ordinary air. These germs have been kept alive for several months in the laboratory, and Prof. Bang found them alive in fœtuses that had been dried up and retained within cows for five, and even nine months. There is good reason for believing that they will live within the cow from one pregnancy to another, which explains why so many cows that have once aborted do the same thing successively.

How the Germs Produce Abortion. The germs lodge between the womb and the after-birth. There in the cotyledons' "milk" they multiply and set up uterine catarrh on the one hand, and the inflamed condition of the fœtal membrane on the other, causing them to become thickened. There is also deposit of secretion between the after-birth and the womb which gradually forces the placenta away. Their work, however, is to poison the placenta, to deprive the calf of its nourishment and to cause stagnation of the circulation in the fœtal membranes. The oxygen pressure between the maternal and fœtal circulations furnishes conditions under which the germs thrive best.

The germs also make their way into the blood of the fœtus, and the intestine of the calf, either by the navel string or the mouth; others enter the uterus and become transferred to the fœtal intestine. This accounts for the germs which cause diarrhœa in the aborted calves.

One of the most peculiar features about these germs is the long period that elapses before abortion follows an injection. Ten weeks at least is required, as verified by inoculation experiments, and in the usual method of injection from cow to cow or otherwise, the period is, probably, much longer.

One peculiar feature of abortion is the apparent immunity which most cows secure after they have suffered from abortion once or twice. It is generally in herds where new cows are from time to time introduced where abortion is kept up. The germ seems to undergo a weakening process, for it is claimed that after abortion had prevailed for a while in a herd the new stock introduced do not abort as easily as the new stock previously introduced. Another interesting point is the probability that in cows that have ceased to abort, the abortion germ is still acting, and though no longer able to produce abortion in that individual it has power to do so in a new animal For this reason every normal birth must be treated with the same care as the abortions.

Modes of Infection. The principal way in which the abortion bacillus is transferred to the cow is through the bull. If an aborting cow, while the vagina is still passing the catarrhal discharge which is filled with abortion germs, is served by the bull, and this bull within a reasonable period serves a sound cow, that cow becomes inoculated almost as thoroughly as though a scientific bacteriologist had introduced a culture. The germs are carried into the uterus and have as early a start in development as the fœtus itself has.

A second method of infection it through the litter and floors behind the stalls becoming soiled with abortion germs from an aborting cow or one which is passing abortion germs. A sound cow lying on the same place becomes infected in the external parts of the genital tract, and, after a long time, the germs enter the uterus. If a pregnant cow has gone five or six months in calf and is exposed to infection she will come in at full term and probably not become infected in the uterus till calving time, and perhaps later.

Another source of infection is the direct transfer of germs from the hindquarters and tail of an aborter to the noses of her companions, and thence transferred by smelling, to other cows. Prof. Bang believes that the germs are also conveyed by the fodder into the intestines, and thence either through the blood, or the fœcal or urinary excretions to the proper locality.

Treatment. The treatment indicated is the direct application of antiseptic measures to the germs themselves, which can be readily reached. Every birth must be treated as an abortion, if the disease prevails in the herd. The barn must be kept clean and disinfected from time to time, air slaked lime spread on the floor and under the cattle and all cows sponged daily beneath the tail with a disinfecting solution. Watch the cows, and as soon as symptoms of parturition or abortion are seen quarantine the cow, and before calving occurs, inject an antiseptic solution. As soon as calving is completed, remove the after-birth as far as possible and disinfect the cow, the floor, the calf and after-birth. The cow should not be allowed to eat the after-birth or lick the calf. Remove the litter and burn it. Disinfect the floor, thoroughly clean it and disinfect it again. Irrigate the uterus with an antiseptic solution. When a cow is to be served which has not recently received a vaginal wash, this should be done, then use boiled water and rinse away the disinfectant. The penis of the bull can be disinfected by means of a rubber tube slipped over the foreskin, through which the fluid can be forced up. The stall of the bull and his belly and legs should all be disinfected.

Antiseptics and Disinfectants. The best antiseptic and disinfectant to use is creolin. For uterine irrigation use one-half to one per cent. solution; for vaginal injection one to two per cent.; for sponging the vulva and the new-born calf two to three per cent.; and for general disinfection of the barn at least four per cent.

SEEDS.

The Vitality of Seeds Treated with Carbon Bisulphid. Circular eleven of the United States Department of Agriculture, Botany Division, reports on a series of experiments conducted to test the effect of carbon bisulphid when used for the destruction of weevils and other insects in stored grain. Experiments were made on thirty-five varieties of grain and vegetables, five of cotton, two of peas, three of corn, two each of rice, garden beans, Kaffir corn, barley and wheat. In the first series of experiments the seeds were allowed to remain for forty-eight hours in an atmosphere saturated with carbon bisulphid after which their germination was tested. The germinative ability of barley, rye, wheat, corn, crimson clover, millet, and rice was considerably decreased by the treatment. The germination of the other seeds was practically uninjured. Other experiments were conducted for a period of twenty-four hours and a limited one with grain in bulk.

As a general result it is stated that seeds of cotton, peas, beans, buckwheat, oats, cow peas, and various members of the crucifers will withstand the most severe treatment without having their germination injured to any extent. On the other hand, excessive exposure to the gas seriously diminishes the vitality of corn, wheat, rye and other seeds belonging to the grass family, oats and Kaffir corn excepted.

STORRS AGRICULTURAL EXPERIMENT STATION

PREPARED BY CHAS. S. PHELPS, VICE-DIRECTOR.

The Storrs (Conn.) Agricultural Experiment Station has an income smaller than that of most of the other American Stations. For this reason its work has necessarily been limited to a few well defined lines of study and investigation. As an offset, greatly to its advantage, however, the Station holds certain relations with the U. S. Department of Agriculture which prove helpful in its own work. The director is special agent on Food Investigations of the Department of Agriculture, and through him certain lines of work and certain facilities are secured which directly or indirectly benefit the work of the Storrs Station.

The leading lines of work undertaken during the past two years are four food investigations as related to man, bacteria in their relation to the dairy, a study of the feeding practices of Connecticut dairymen, and the effect of nitrogenous fertilizers on the composition of certain fodder crops.

At first thought it might seem that food investigations did not fall within the proper domain of the work of an Experiment Station, but when we consider that about thirty-seven per cent of the entire population of the States is engaged in farming we can begin to appreciate that what the farmer eats is of vast importance to the welfare of the entire population. As man is a higher organism than the beast which serves him, so those things which pertain to the welfare and happiness of mankind are of far greater importance than those which affect the beasts under his care. A knowledge, too, of the great laws of nutrition, in the case of man, has direct application to other animals. These laws are essentially the same throughout the domain of the higher animals.

Food investigations are bringing out two facts relating to the food of the American people which are of especial significance. The first is that as a class Americans are needlessly extravagant and wasteful in regard to their food; and second that our diet is arranged to suit our palates rather than the real needs of the system. Fortunately the question of wastefulness applies far less to the farmer's household than to that of his city brethren, both rich and poor. Many of the laboring classes of our larger cities are known to buy the highest priced meats, without regard to cost or nutritive values, in order that they may "live as well" as the man who occupies the brown-stone front of the most aristocratic part of the city. This false economy not only prevents their "living as well" as they might, but deprives the family of the means to provide many of the comforts of life. The common statement that a French cook could support a family on what the ordinary American family wastes finds its proof in many of the families of our cities to-day. But the second statement that our diet is arranged to suit our palates rather than to accord with the nutritive value of the food, or the direct needs of the body, has a more wide-spread application than the one of wastefulness. We are giving more thought to-day to the food of the cow than we are to the food of our families. We figure with considerable nicety the amount and proportions of protein, fat and carbohydrates which we should feed to get the largest flow of milk from our herds, but nothing better than the experience of our mothers, or often what is worse, guess work, finds application in deciding what we shall feed our families. Is not the question of the physical and mental development of our children of vastly greater import than how much or how good milk the cow shall give? Recent food investigations point to the conclusion that the majority of people eat too much of sugars, and often of starchy products, and too little of that great building material known as protein or albuminoids. In other words, we eat too much sweet stuffs and too little bread, beans, peas and lean meat, and drink too much tea and coffee, which have no direct food value, and too little milk, which is relatively one of the most nutritive and valuable of our food products. Skim-milk and cheese are cheap, nutritious and wholesome food products, which might be made available in many ways by nearly every farmer's family. Our prejudice against the former of these is based on a false supposition that skim-milk is "thin and blue," and, being nearly devoid of fat, has little value. Chemical analysis, and experience in its use, shows this to be a most valuable food product. Wealth if not fame awaits the man who can get this product on the market devoid of most of its bulk (water) and in a form which will preserve its food value and palatability.

Perhaps no one line of scientific inquiry has brought more of real value to the farmer of to-day than the study of bacteria. The Storrs Station has made a special study of bacteria in relation to the dairy. It was the first station in this country to call attention to the fact that all changes in milk are due to germ life, and especially to the fact that cleanliness was the only method by which undesirable germs could be kept out of milk and butter. Dr. Conn was the first American to demonstrate the value of pure cultures in butter making, and in "B. 41" has given the country a pure culture which has not been excelled in the delicious aroma it gives to butter. For the past year the doctor has been travelling in Europe studying the latest methods in bacteriology.

In the winter of 1892-3 the Storrs Station began a series of studies of the feeding practices of Connecticut dairymen; these have been conducted each winter since. A general summary of five winters' work has recently been made, and shows many points of practical value. The station sent one of its own men to different dairy farms for the purpose of studying by actual weights, and by taking samples of feeds which were later analyzed, the kind of rations in actual use, and the results obtained from their use. As soon as the fodders could be analyzed and the rations calculated, new rations were suggested, and a second test was made on many of the herds from two to four weeks after the first. The milk was all carefully weighed, and was tested daily by the Babcock method. The test periods were short, but are thought to give results of much value regarding the economy of rations. The herds tested were perhaps above the average for dairy herds in Connecticut, but were not selected as the best. They are simply fair representatives of the better class of dairy herds of mixed breeding. Thirty-two distinct herds were studied for periods varying in different cases from five to twelve days. The yields of milk and butter from these thirty-two herds are of special interest, and show that either there must be a very wide range of profit in Connecticut dairying, or else that many herds are kept at a loss. It may be well to state that these studies did not include cows which were giving less than about 5 lbs. of milk per day. The average yields of milk for these thirty-two herds during the periods when the farmers were feeding their own rations ranged from 13 lbs. to 23½ lbs. per day, and the butter from 7-10 to 1⅓ lbs. per day. As stated in terms of percentage, the herd giving the largest flow of milk produced 80 per cent. more than the one producing the smallest flow; while the herd giving the most butter produced 90 per cent. more than the one giving the smallest amount. During the three seasons ending with the winter of 1896-7, which represent periods when the market value of feeds was fairly uniform, the cost of rations based on average market values in ton lots ranged from 13 to 23 cents daily per cow. The cost of the rations was regulated very largely by the proportion of the cheaper coarse fodders, like corn silage, corn stover, clover hay, oat hay and cheaper grades of mixed hays which went to make up the total coarse fodder feed. A liberal proportion of the nitrogenous grain feeds, while not materially increasing the cost of the rations, did add greatly to their manurial values. The better grades of hay, such as timothy and red-top, were among the most expensive feeding stuffs used. This is due to the fact that good hay in Connecticut generally sells readily at from $14 to $18 per ton. Owing to the abundant hay crop of 1897, however, good hay has sold for $12 per ton during the past year.

In thirty-two separate herds studied, the rations fed being those in actual practice by the several farmers, the yields of milk and butter seemed to depend mainly on the amount of protein fed. This is shown by averaging the results obtained with herds receiving more than 2 lbs. per day of digestible protein and comparing them with the results obtained where less than 2 lbs. of protein were fed. It so happened that the number of cows in the two groups was practically the same (226 and 227) and that their breeding was quite similar. The greater part of the cows in both groups were grades and thoroughbred Jerseys and Guernseys. The cost of the rations in the two groups has been calculated, but is based on the market prices for feeding stuffs in December, 1897. At that time cornmeal and wheat bran were relatively low in price, while the nitrogenous grain feeds, like cottonseed and linseed meals, were relatively high, and the average cost of the rations high in protein is 1.5 cents more than those low in protein. The herds which were fed the larger quantity of protein, however, produced enough milk and butter to more than make up for the additional cost of the rations. In other words, the rations containing more than 2 lbs. of digestible protein paid better, even if we leave out of account their greater manurial value, than the rations containing less than 2 lbs. The average results obtained from the two groups of herds are shown in the following table :

A. Average milk and butter yields and the cost of rations from 16 herds, 226 cows, where less than 2 lbs. of digestible protein per day were fed.

B. Where more than 2 lbs. were fed, 16 herds, 227 cows.

	Protein.	Nutritive ratio.	Daily milk.	Average fat.	Daily butter.	Cost of ration.
	lbs.		lbs.	per cent.	lbs.	cts.
A	1.62	1 : 8	16.3	4.7	.87	15.0
B	2.32	1 : 6	18.7	4.9	1.05	16.5

In connection with field experiments on the effect of nitrogenous fertilizers on the yield of grass, oats, corn, and a few legumes, analyses of the crop have been made to study the effect of nitrogen in the fertilizer on the proportion of nitrogen and protein in the crop. It has been pretty thoroughly demonstrated that nitrogenous fertilizers increase the yield of grasses and grains, and, if at the same time, it can be shown that the composition and feeding value of the crop is improved, we have a double advantage in the use of such fertilizers.

In 1890 the Storrs Station started a series of field experiments (⅛ acre plots) to study the effect of different quantities of nitrogen on the yield and composition of mixed grasses as compared with the results where no nitrogen was used. All of the fertilized plots had a uniform quantity of mineral fertilizers (phosphoric acid and potash), while the quantity of nitrogen varied from nothing to 25, 50 and 75 lbs. per acre. These quantities of nitrogen were supplied on one series of plots by the use of 160, 320 and 480 lbs. per acre respectively, of nitrate of soda, and on another series of plots by 120, 240 and 360 lbs. per acre of sulphate of ammonia. The experiment was continued through three years. The yield of hay where 25 lbs. of nitrogen per acre were used was about 50 per. cent. greater than where mineral fertilizers only were used, and increased to as high as 100 per cent. where 75 lbs of nitrogen were applied in the fertilizer. The average percentage of protein in the dry matter of the crop was as follows : where mineral fertilizers only were used, 7.82 per cent. ; where 25 lbs. of nitrogen per acre were added with the mineral fertilizers, 7.75 per cent. ; where 50 lbs. of nitrogen were added, 8.46 per cent. ; where 75 lbs. were added, 9 40 per cent. It would seem at first that no increase in protein resulted where 25 lbs. of nitrogen were added over what was obtained when only mineral fertilizers were used. This was later found to be due to the fact that considerable clover grew on the mineral plots which was not excluded in taking the samples. This made the percentage of protein too high where mineral fertilizers alone were used, and *apparently* too low where the smaller quantities of nitrogen were used.

A similar series of experiments was laid out on some 1-80 acre plots with pure species of grasses, and these show even greater effect of the nitrogen than the experiments on the larger plots. In sampling, everything except the particular grass experimented with was excluded. The amounts of fertilizer used per acre were the same as in the experiments just described except the plots with 50 lbs. of nitrogen were omitted. The results obtained are shown in the following table :

EFFECT OF NITROGENOUS FERTILIZERS ON THE PERCENTAGE OF PROTEIN IN GRASSES.

Kind of grass.	Mineral fertilizers, protein	Mineral and 25 lbs. nitrogen, protein	Mineral and 75 lbs. nitrogen, protein
	per cent.	per cent.	per cent.
Timothy	7.25	7.34	9.07
Orchard grass	8.16	9.50	12.37
Red top	6.60	7.27	9.50
Meadow fescue	7.24	8.81	12.05
Tall meadow oat-grass	7.50	9.70	12.63

A similar series of field experiments to those with mixed grasses have been carried out with Indian corn, oats, and soja beans. In the experiments with corn and oats the effect of the fertilizer on the stover and straw corresponds in general with those obtained on the grain. The following table gives the results on the seeds only:

Kind of fertilizer per acre.	Corn (maize), protein	Oats, protein	Soja beans, protein
	per cent.	per cent.	per cent.
Mineral fertilizer	10.13	14.76	38.05
Mineral and 25 lbs. nitrogen	10.60	14.66	38.58
Mineral and 50 lbs. nitrogen	10.91	15.55	39.24
Mineral and 75 lbs. nitrogen	11.70	16.16	40.77

The lesson to be drawn from these experiments is that in the use of nitrogenous fertilizers, or of manure rich in nitrogen, we are not only increasing greatly the yield of grasses and grains but at the same time are increasing the feeding value of the crop. Not only is the composition improved, but there is reason to believe that in the case of grasses the digestibility of the crop is improved where heavy applications of nitrogen are made, due to the fact that the proportion of fine, leafy, tender growth, which is easily digested, is greatly increased by the nitrogen. If "he who makes two blades of grass to grow where one grew before is a public benefactor," then he who makes two blades of more valuable grass to grow in place of one blade of poorer grass must be a double benefactor of humanity.

NORTH DAKOTA EXPERIMENT STATION.

PREPARED BY J. H. SHEPPERD, AGRICULTURIST.

FEEDING THE WORK HORSE AND MULE. It is the common experience for horses and mules to lose in weight when the heaviest of the season's work taxes their strength. Plowing, harvesting and threshing reduce them as a rule. Omnibus and street car horses give an idea of the amount of work a horse can stand at such labor when in constant service for the year. The data obtained from that source are not fully applicable to the class of labor to which farm horses and mules are subjected.

In North Dakota some of our farmers work large tracts of land, plow long furrows, cut long swaths, and do their work in a wholesale way in general. They instruct their plowmen to make their teams draw plows sixteen, eighteen, twenty and twenty-two miles per day, according to the manager's idea of the economy of the different rates of work. I am told that by putting five horses or mules on a gang plow, consisting of two fourteen inch plows, and limiting the distance travelled to eighteen miles per day, allow the animals to nearly hold their weight. Some data obtained from feeding tests at this station serve as an indication of the amount of work which a horse can perform without losing flesh. In case of heavy working, it will be seen by the table below that the animals were given a heavy feeding of grain, but were still unable to maintain their weight.

Four heavy grade Porcheron draft horses, averaging 1,480¼ lbs. weight, were fed during the trial. All of the horses were on each side of the experiment and all conditions seem practically the same, except that the horse Dan was fed oats during one trial and bran and shorts, mixed in equal parts by weight, during the other. It will be seen upon another page, however, that a comparison of these two grain feeds show no practical difference in their value, pound for pound. These four horses constitute two two-horse teams, Grant and Harry forming one team and Mac and Dan the other. Both are quiet, tractable draft teams and work together well. During the thirty-five day periods the two teams did practically the same kind of work. They were worked at plowing, harrowing and drilling in grain. They worked ten hours each day with one or two exceptions, the average number of hours being less by reason of their having remained idle for two whole days. In all cases the rate of work per day is reckoned upon the basis of the working days, all of the horses having been allowed to rest on Sundays. The two horses averaging less work per day, worked ten-hour days when they worked, the same as the heavier worked ones, but had whole or half days enough for resting to bring down the average to the numbers given.

The twenty eight day periods were not employed in exactly the same kind of work, and were not for the same times in the year exactly. The kind of work was the same, however, except that Dan, of the lighter worked lot, did harvesting, while the heavier worked lot did plowing.

The following table gives the facts in detail for each lot, as well as for three mules which worked an average of nine hours per day:

HORSES DOING NINE OR MORE HOURS' WORK PER DAY.

Name of horse.	Grain per day, lbs.	Kind of grain.	Hours work done.	Loss in weight,	Gain in weight,	Hay eaten,	Length of time.	Weight of horse,
				lbs.	lbs.	lbs.	hrs.	lbs.
Grant	$23\frac{11}{14}$	Bran and shorts	9½	70	....	....	28	1,417
Harry	$23\frac{25}{28}$	"	9½	50	....	....	28	1,452
Mac	18	"	9	50	....	....	35	1,615
Dan	18	"	9	45	....	....	35	1,437
	$83\frac{19}{28}$	....	37	215	....	....	126	5,921
Average	21	....	9¼	53¾	....	....	31½	1,480¼

HORSES DOING EIGHT AND A FOURTH HOURS OF WORK PER DAY.

Name of horse.	Grain per day, lbs.	Kind of grain.	Hours work done.	Loss in weight,	Gain in weight,	Hay eaten,	Length of time.	Weight of horse,
Grant	18	Bran and shorts	$8\frac{1}{10}$	....	....	....	35	1,417
Harry	$19\frac{11}{16}$	"	$8\frac{1}{10}$	....	30	....	35	1,452
Mac	$23\frac{25}{28}$	"	$8\frac{5}{12}$	....	80	....	28	1,615
Dan	$17\frac{25}{28}$	Oats	$8\frac{9}{24}$	....	....	....	28	1,437
	79½	....	33	....	110	....	126	5,921
Average	19⅞	....	8¼	....	27½	....	31½	1,480¼

MULES DOING NINE HOURS' WORK PER DAY.

Name of horse.	Grain per day, lbs.	Kind of grain.	Hours work done.	Loss in weight,	Gain in weight,	Hay eaten,	Length of time.	Weight of horse,
Frank	$11\frac{3}{35}$	Bran and shorts	9	....	....	....	35	1,069
John	$11\frac{6}{35}$	"	9	20	....	....	35	1,001
Queen	$15\frac{12}{35}$	"	9	....	30	....	35	1,161
	$37\frac{19}{35}$	....	27	....	10	....	105	3,231
Average	$12\frac{27}{35}$	....	9	....	3⅓	....	35	1,077

By the above table it will be seen that each of the horses lost weight perceptibly when worked from nine to nine and a half hours per day. They were fed a heavy ration of grain but it did not maintain them.

It will be further seen that two of the horses doing eight and a quarter hours' work per day gained in weight, while the other two were maintained without loss; they received an average of about two pounds less grain per day than the heavy worked lot. It will also be noted that the three mules maintained their weight while doing nine hours' work per day. They required only about 12⅔ pounds of grain per day to keep them from losing flesh, while the horses failed to keep up on 21 pounds of grain per day, and required almost 20 pounds to keep them up when doing 8¼ hours' work. This makes a showing of seven pounds less grain per head per day in favour of the mules, while they were doing heavier work than the horses.

HAY *versus* STRAW FOR LIGHT WORK. Eight horses and four mules were used for making this trial. With reference to their keeping qualities they were divided into four classes by the attendant, who has fed all of them for two or more years. He divided them into four classes, as follows: One horse was called very easy to keep; three mules and one horse were called easy to keep; four horses were called average to keep; two horses and one mule were called hard to keep. The eight horses averaged 1,414 lbs. in weight. The four mules averaged 1,112 lbs. in weight. They were divided as nearly even as possible into two lots of four horses and two mules each. They were fed hay and stray respectively for sixty days. The first, which received hay during the first thirty days, was given straw during the second thirty day period. All of the animals were thus placed upon each side of the experiment so that their individuality would be neutralized. They were all mature vigorous work stock and none of them old nor badly worn. Oat straw of good quality was used, and the hay was from the upland prairie, rather fine and of a good grade. Half of the animals were given oats as a grain feed and the other half a mixture of bran and shorts, equal parts by weight. These rations were also alternated during the two feeding periods, so as not to interfere with the comparison of hay with straw. The following table gives the result of the trial:

RATION: STRAW AND GRAIN.	Grain eaten.	Straw or Hay.		Loss in weight.	Work done.
		Eaten.	Refused.		
	Lbs.	Lbs.	Lbs.	Lbs.	hours.
Total for twelve animals for 30 days.....	4,379	5,740	1,523	318	852
Average per head.....................	365	478	127	26½	71
RATION: HAY AND GRAIN.		Hay.			
	Lbs.	Lbs.	Lbs.	Lbs.	hours.
Total for twelve animals for 30 days.....	3,495	9,323	1,791	311	850
Average per head.....................	291	777	149	26	71

From the above table it will be seen that when fed straw the animals lost a half pound more flesh than they did when given hay. They did the same number of hours' work per day and consumed seventy pounds more grain.

They were kept up in flesh on the straw ration as well as when given hay. They did light work, an average of 2⅓ hours per day per head. This experiment indicates that horses can be maintained, while at light work, on straw, if enough grain be given. The question next arising is whether the additional cost for grain will be equal to or greater than the saving by the use of straw for roughage.

The following valuation was placed on the feeds used, which was the market price in Fargo when they were fed.

Oats, per bushel	$ 25
Bran and shorts, per ton	12 00
Hay (prairie), per ton	5 00
Straw, per ton	1 00

Periods Fed Straw.

175 lbs. oats	$ 1 37
189 lbs. bran and shorts	1 13
605 lbs. straw	30
Average cost per head per month	$ 2 80

Periods Fed Hay.

141 lbs. oats	$ 1 12½
150 lbs. bran and shorts	90
926 lbs. hay	2 31
Average cost per head per month	$ 4 33½
Difference	1 53½

The difference in the cost of keeping horses on hay and straw will differ according to the prices which feed is worth on the market. The saving comes largely from the difference in the value of hay and straw. It requires more careful feeding to keep horses in good condition on a straw ration, as the quantity of grain the different ones will require differs more than when hay is fed. Some horses eat straw very much less readily than others. The horses used in this test were given good care in the way of grooming, bedding, and comfortable quarters.

OATS *versus* BRAN AND SHORTS.—The horses and mules already described were used in this trial of oats against bran and shorts as a grain feed. Good upland prairie hay was fed for roughage. The trial covered a period of 174 days, during which time the work was reasonably uniform. The animals were divided into two lots, and the lots were alternated by periods upon the oats and bran and shorts rations. The bran-and-shorts-fed lot had six horses on the trial during one four week period, while the oats-fed lot had but three. Allowance was made for that difference in all of the calculations.

The following table gives the summarized results :

Bran and Shorts, Equal Parts by Weight, Compared with Oats.

—	Grain eaten.	Gain or loss in weight.	Work done.
	Lbs.	Lbs.	Hours.
Feeding bran and shorts :			
Total equal to 876 horses one day	12,910	Loss 10	5,760
Weekly average per horse	103	Loss 1-12	46
Feeding oats :			
Total equal to 792 horses one day	11,838	Gain 10	4,796
Weekly average per horse	105	Gain 1-12	42

It will be noticed that there was a slight loss in weight of the bran-and-shorts-fed horses and a small gain in weight of the oats-fed animals.

The trial indicates that bran and shorts mixed equal parts by weight have as great a feeding value as oats. Bran and shorts fed to stock increase the fertility of the soil, and will need a certain amount of credit upon the account as fertilizers. Without considering the added fertility their proportionate value would be as follows : With oats worth 25 cents per bushel, bran and shorts are worth $15.60 per ton. Bran and shorts mixed equal parts by weight make a palatable food for horses, and require little, if any, more skill in feeding than is necessary to feed oats.

Prices for bran and shorts are frequently low enough to give the owner of work horses and growing colts a margin of profit from disposing of his oats and purchasing bran and shorts. An occasional change to this grain adds variety which is relished by horses.

WHEAT FOR HORSES. Wheat which is off grade frequently forms cheap grain for stock. To test the value of wheat for horses this station carried on an experiment with two horses and a mule by feeding them No. 1 hard wheat and prairie hay for a period of twenty-eight days. These horses ate an average of about fourteen pounds of wheat per day and worked eight hours per day for all of the working days of the month. They gained an average of fifteen pounds per head in weight. One of the number, a large horse weighing 1,550 pounds at the time of the trial, showed a loss of only fifteen pounds in weight for the month, after doing an average of nine hours work per day for all of the working days of the month. He ate an average of a little less than fifteen and one-half pounds of wheat per day.

The trial demonstrated clearly that it is scarcely safe to use whole wheat alone as a grain feed for horses, and the less expert the feeder the greater the risks. It was with difficulty that these horses were kept from getting off feed, and becoming otherwise deranged in digestion. A large proportion of the kernals passed through the alimentary tract unbroken, while other grains were broken but only partially digested.

OATS *versus* BRAN AND WHEAT (GROUND). In this test the bran and wheat ration consisted of a mixture of one part bran to two parts of ground wheat by weight. Two horses and a mule were used for this test and gave the result tabulated below :

Whole Oats Compared with a Mixture of Two Parts Ground Wheat and One Part Bran, by weight.

—	Grain eaten.	Gain or less in weight.	Work done.
	Lbs.	Lbs.	Hours.
Feeding wheat, meal and bran :			
Total six horses four weeks	1,266	Gain 95	310
Average per horse four weeks	211	Gain 16	52
Feeding oats :			
Total six horses four weeks	1,413	Loss 5	296
Average per horse four weeks	235	Loss 1	49

The horses ate regularly from each ration, giving no favor to either food. It was not possible to control the work during the different periods to make them directly comparable one with the other, but the work during the four periods was arranged so that the summary is near enough equal for the two rations to be directly comparable.

It will be seen that the horses averaged three hours more work per month each while on the bran and wheat ration, and made an average gain of sixteen pounds per month ; while during the oats fed periods they lost one pound per head and consumed twenty-four pounds less feed per head per month.

The horses did nicely on the ration consisting of two parts of ground wheat and one part bran with prairie hay. Wheat is a concentrated food, and needs this amount of bran to make it loose and cooling enough for the digestive system of the horse.

The oats fed in this test were whole oats of excellent quality. This experiment would indicate that the ground wheat and bran ration is worth more for horses on light work than whole oats.

BRAN, WHEAT AND SHORTS COMPARED WITH BRAN AND SHORTS. In this experiment a comparison was made of a ration consisting of a mixture of bran, wheat and shorts, equal parts by weight, with a mixture of bran and shorts, equal parts by weight.

Four horses and two mules were divided into two similar lots of two horses and a mule each for this trial of four months' duration. The grain feeding was changed at the end of each twenty-eight-day period, so that each lot of animals was on either feed mixture an equal length of time. Whole wheat was fed during this test. The following table shows the results obtained :

—	Grain eaten.	Gain or loss in weight.	Work done.
	Lbs.	Lbs.	Hours.
Feeding bran, wheat and shorts :			
Total twelve horses four weeks	5,068	Gain 20	1,775
Average one horse four weeks	422	Gain 2	148
Feeding bran and shorts :			
Total twelve horses four weeks	4,941	Gain 160	1,642
Average per horse four weeks	412	Gain 13	137

The summary shows that the wheat-fed lots consumed an average of ten pounds more feed per head per month, gained eleven pounds less and did eleven hours more work per month. The test would indicate that whole wheat has no advantage over a like amount of bran and shorts when added to a ration consisting of bran and shorts.

If a mixture of equal parts by weight of bran and shorts was worth $15 a ton—three-fourths of a cent a pound—wheat would, according to the above test, be worth the same rate per pound, or forty-five cents per bushel. The poorest grade of wheat, No. 2 Northern, and even rejected wheat which is in good condition, makes better horse-feed than high grades of wheat, as it contains a higher percentage of nitrogenous matter than high grade wheat. It can often be utilized in this way to the advantage of the feeder.

AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ILLINOIS.

PREPARED BY E. DAVENPORT, DIRECTOR.

THE DAIRY COW. One of the questions that has been engaging the attention of the Agricultural Experiment Station of the University of Illinois is the range and character of variations in milk from day to day, whether produced by the same or by different cows. Of course the ultimate question is the cause of such variation, but many curious facts develop during the progress of the investigation. The following principles seem to be fairly well established :

"The yield of milk from different cows under the same conditions differs greatly, and that from the same cow varies widely from day to day.

"The composition of milk is highly variable ; the ratio of fat to other solids, and that of solids to water, are not constant as between different cows or for the same cow on successive days.

"The percentage of fat, or of other solids, is not always highest in the smaller yields, but cows that give milk with a high per cent. of solids generally show a low total yield.

"Fat is the most variable constituent of milk, and its variations are independent of those of the other solids ; therefore the yield of milk is a better index of the other solids than it is of the fat.

"As regards the first and last milk drawn, the proportion of solids not fat is higher in the first, but the proportion of fat is decidedly greater in the last.

"When the milking periods are unequal the longer period will generally, though not always, give the larger yield of milk, of fat, and of solids not fat; but the difference in yield does not correspond to the difference in time; that is, the secretion calculated per hour is greater during the shorter period.

"Neither day time nor night time is shown to be superior as a milk-producing period.

"Different cows differ in their power to make milk from food, and the same cow varies in this respect from time to time.

"It pays to select the individual according to her power to manufacture milk from food, and according to the character of the product.

"Aside from the influence of food or environment each animal exhibits individual variations of her own, and such variations tend to show something like periodicity in the separate functional activities of the animal body."

Perhaps the most important economic fact developed is the wide difference between individuals as producers of dairy products; of two cows fresh on the same day, and both accounted good, one produced forty-eight per cent. more milk and eleven per cent. more fat than the other on the same feed of grain and with an excess in roughage of only 7.6 per cent. This difference is certainly greater than any reasonable percentage of profit, and shows that dairy enterprise should begin with the selection of the cow.

Some bacteriological investigations have developed the fact that the cow herself is a constant source of infection to her milk; that is, the bacteria that injure milk find the body of the cow to be a favorable place for their lodgment and development. This being true of all foreign material, dust from the cow is one of the most certain and prolific sources of contamination. It is all the more potent because it attracts so little attention from the eye, but the unerring Petrie dish and the microscope reveal the fact that this innocent appearing dust is loaded with germs of living organisms. Hence washing and wiping the parts of the cow is vastly preferable to brushing.

CULTIVATING THE SOIL. On the rich prairie soils the matter of cultivation is at present of even greater importance than that of fertility. Exhaustive experiments in cultivation at known depths were conducted last year with the general result that on these soils cultivation is largely a matter of killing weeds and saving moisture; that for the latter purpose a cultivation of three inches is vastly more efficient than is one of an inch or even two inches, but that all deep cultivation of corn is attended with a degree of root pruning that is detrimental to the crop. Mulching without cultivation produced a higher yield than did any form of culture.

TABLE SHOWING EEFECT OF DIFFERENT SYSTEMS OF CULTIVATION..

—	Mulched.	Ordinary.	Tower.	Six inch. shovels.	Ridged.
Weight of ears, lb	551	474.5	441.25	444.25	410.75
Weight of stalks, lb	490	455	453	359	405
Number of ears	1065	1037	1094	1072	1019
Per cent. of moisture	493	455	479.7	469	467.4

In the above table the figures after the term "per cent. of moisture" are had by adding the various percentages obtained at all the different determinations during the season. They therefore represent the comparative moisture of the different treatments.

SUGAR BEETS. Not a little of the energy of the station was directed last year to the attempt to discover whether Illinois is adapted to the growth of the sugar beet. The results of the year's investigations seemed conclusive on that point, and to the effect that both soil and climate are favorable. A fact developed that is often lost sight of, viz., that popular ignorance of the details of a new industry is itself sufficient to prevent success until it is removed by careful and systematic training, particularly in the case of an enterprise that engages so many individuals and so much capital as does that of the beet sugar enterprise.

This investigation has forced upon the people of Illinois, as nothing else has ever done, the importance of trifles as influencing the balance sheet. For example, if the seed is planted an inch too deep no after care can make amends and produce a profitable crop.

SELECTION OF SEED. This station has conducted some unique experiments in yield of different varieties of corn. A dozen well known varieties are always raised to serve as a standard, and each year a few new ones are pitted against them, not in single plats, but in oft repeated strips running through and across the field and in alternation with the well known or standard varieties. The result is a demonstration that, as between seemingly good varieties, the differences are greater than any expected profit on the crop; that is, that choice of suitable variety may be of itself enough to ensure profit, and that no labor or expense can avail against even a partially unsuitable variety.

In all the work of the station the importance of exact knowledge and of requisite details are more and more emphasized, adding new testimony to the fact that agriculture is rapidly becoming a science.

KANSAS EXPERIMENT STATION

PREPARED BY THOS. E. WILL, PRESIDENT

Since the beginning of the year the Kansas Experiment Station has been occupied as follows:

The Veterinary department has been engaged in experimentation and the publication of a bulletin (No. 79) upon bovine tuberculosis; in attending and prescribing for ailing farm animals; dehorning cows for college farm; studying swine disease on college farm; writing various articles on swine plague, blackleg, abortion, etc., for country papers; diagnosing and investigating diseases of animals in the interest of the State Live Stock Sanitary Commission; editing veterinary column of *Kansas Farmer;* studying the outbreak of an infectious disease of the genital organs of heifers, and finding successful remedy; preparing laboratory for the manufacture of blackleg vaccine, etc.; in work on protective inoculation against swine plague; bacteriological examinations of healthy and diseased milk, and experiments with remedies for roup in chickens—so far successful.

The Chemical department has published a bulletin (No. 68) on Soil Moisture.; has continued its experiments on sugar beets, and published a bulletin (No. 78) on them; has analyzed corn in connection with seed-breeding experiments, proving that there is a great difference in the protein content of varieties of corn grown in this State, that there is great variation in the protein content of different ears of the same variety, and that there is considerable variation in the protein content of individual kernels from the same ear, even in a variety of fixed type, and thereby arriving at the belief that permanent improvement can be achieved by selection based on composition. The department is now seeking a method whereby selection can be made without actual analysis.

The Horticultural department has tested the comparative productiveness and value of varieties of fruits, namely, apples, peaches, plums, cherries, grapes, and small fruits; it has undertaken to improve the present varieties by selection, tillage and crossing, giving especial attention to such of our native varieties as are most promising, and has crossed several hundred varieties; it has sought to determine the value of cover crops for orchards, and the kind of crops best suited for the purpose, and has compared the value of soil mulches with that of cover crops; it has investigated the market methods and facilities of the State with a view to the introduction of better methods; has experimented with root grafting, and with methods for increasing the productiveness of varieties; has experimented on the wintering of cabbages in cold frames, spraying for fungous diseases, and testing of nut-bearing trees most suitable to our climate; and has assisted in the co-operative test of peach trees outlined by the Association of American Agricultural Colleges and Experiment Stations.

The Entomological department has studied the most important insects injurious to farm and orchard crops and to stored grain, among them being grain insects, potato stalk weevil, scale insects, corn weevil, cigar case-bearer, leaf roller, bud moth, and cabbage worm—bulletins on which study are now in preparation ; and has experimented in spraying and testing insecticides. Representatives of the department have visited various portions of the State to study local conditions. A collection of insects of economic importance has been and is still being made, and a bulletin (No. 77) on Some Insects Injurious to the Orchard has been published.

The Botanical department has published two bulletins (Nos. 76 and 80). Bulletin 76 was entitled, Fifth Report on Kansas Weeds : Vegetative Propagation of Perrenial Weeds. It contains a description of methods of vegetative propagation of some perrennial weeds ; the methods of propagation are classified, and suggestions for killing the weeds are offered. Notes are presented of sprouts from pieces of roots. Forty-eight species are described, and twelve plates with sixty eight figures, are appended. Bulletin 80 is entitled, Sixth Report on Kansas Weeds : Distribution and Other Notes. It consists of general notes upon eighty bad weeds, the nativity of our weeds, methods by which seeds are scattered, how weeds occupy new and bare soil, the distribution and description of 211 species found in Kansas, and estimates for a few species of the number of seeds that a single plant will produce. Appended to this bulletin are sixteen plates of maps showing distribution by counties of 209 species in Kansas, and distribution by States of eighty species in the United States. The department has actively co-operated with the agricultural and chemical departments in the conduct of seed-breeding experiments looking toward the origination and discovery of new varieties of farm crops, especially wheat, oats, corn and Kaffir corn. A good start has been made, sixty crosses of wheat and twenty-four of oats having been successfully effected. A trip has been taken into south-western Kansas in quest of information concerning native grasses and other forage plants. Notes are on hand for the publication of a bulletin on the grasses, and another upon seed breeding.

The Agricultural department closed out the old line of experiments and entered upon work entirely new. In the field, experiments are in progress upon the conservation of soil moisture, seed-breeding and the inoculation of the soil with microbes forming tubercles upon the roots of legumes. All of this work must be pursued for years before results of value can be secured. The department has planned to enter upon extensive experiments in feeding. This work, however, has been restricted by the necessity of exterminating tuberculosis from cattle and swine and disinfecting the stables and yards. For this reason no steers could be fed, and only such hogs as were owned by the college could be used. Sixteen lots of hogs were used to test the value of corn, Kaffir corn, and Soy beans in pork production, with the result that in the different lots Kaffir corn showed a fattening value of from 84½ per cent. to 90 per cent. of that of corn, and that when a mixture of one fifth Soy bean and four-fifth Kaffir corn was fed the mixture produced twelve to twenty-two per cent. more pork per bushel than corn. Experimental work in dairying was also planned. This, too, was hindered by the condition of the barn, in which the tuberculous herd had been kept. Trials were made of Alfalfa hay and Kaffir corn grain, which showed that these two feeds given together produced butter of a good quality at a low cost.

MAINE AGRICULTURAL EXPERIMENT STATION.

Prepared by Charles D. Woods, Director.

The Inspection of Feeding Stuffs.

With the increased use of concentrated feeding stuffs, it has been found by chemical analysis and feeding tests, as well as by common experience, that there are great differences in the feeding values of goods which outwardly closely resemble each other. The following instance illustrates this :

Some time ago the station purchased a quantity of cotton-seed meal from a dealer. A few weeks later the firm offered at a somewhat reduced rate a brand which, to outward appearance, was apparently equal to the first. Yet chemical analysis showed that the first contained 52.2 per cent. protein and the latter only 31.9 per cent. In other words, one, which was an unusually good article, contained over sixty per cent. more protein than the other, which proved much below the average. As regards the feeding value, the actual difference was much greater, since the amount of ash found in the lower grade indicated that the adulterant used was of inferior quality, and the digestibility of the protein present must have been affected thereby.

There was a great dissatisfaction with the existing state of things among the farmers of the State, as evidenced at the farmers' meetings, such as that of the State dairy meeting, State board of agriculture and State grange, and as a result, the legislature of 1897 passed a law entitled "An Act to Regulate the Sale and Analysis of Concentrated Commercial Feeding Stuffs." In essence the law is identical with the law regulating the sale of commercial fertilizers, and is the first attempt to establish an adequate control over the sale of offals and other by-products used as food for cattle and other live stock.

The chief requirements, concisely stated, are as follows :

Kinds of feed coming within the law. The law applies to all feeding stuffs except hays and straws, whole seeds and meals of wheat, rye, barley, oats, Indian corn, buckwheat and broom corn, brans and middlings. The principal feeds coming under the provisions of the law are linseed meals, cotton seed meals, pea meals, cocoanut meals, gluten feeds, maize feeds, starch feeds, sugar feeds, dried brewers' grains, malt sprouts, hominy feeds, cerealine feeds, rice meals, oat feeds, corn and oat chops, ground beef or fish scraps, mixed feeds, and all other materials of similar nature.

Inspection tax and tag. To meet the expenses of inspection, a tax of ten cents per ton must be paid to the director of the Maine Agricultural Experiment Station. On receipt of the inspection tax, the director of the station is required to furnish a tag stating that all charges have been paid. This tag must be affixed to the package before it is offered for sale.

The Brand. Each package of feeding stuff included within the law shall have affixed the inspection tax tag and shall also bear, conspicuously printed, the following statements :

The number of net pounds contained in the package.
The name of trade mark under which it is sold.
The name of the manufacturer or shipper.
The place of manufacture.
The place of business of manufacturer or shipper.
The percentage of crude protein.
The percentage of crude fat.

These statements may be printed directly on the bag, on a tag attached to the package, or on the back of the inspection tax tag furnished by the director of the station.

A copy of the statement of brand must be filed with the director of the station. The goods must carry the inspection tax tag and the brand before they can be legally offered for sale in the State. It will not answer to affix tags at the time the goods are sold.

Analysis. The director of the station is required to collect and analyze, each year at least, one sample of each of the brands of feeding stuffs coming within the provision of the Act, and publish the results, together with related matter, from time to time.

The law has been in operation nine months, and even in this time has proven of advantage to the manufacturer and dealer in honest goods, as well as a protection to the consumer. The most conspicuous case of adulteration by concentrated feeding stuffs is the cotton seed meal. Pure cotton seed meal is made by grinding the seed after the white down which remains upon the seed as it comes from the cotton gin, and the hard hulls, have been removed. Thus prepared, cotton seed meal carries from forty to fifty-three per cent. of protein. At first, cotton seed meal was all high grade goods. The temptation to adulteration was too strong for unscrupulous manufacturers to withstand, and the market was overrun with cotton seed meal adulterated with finely ground hulls. This made a dark colored meal, the color of which was sometimes "improved" by grinding and mixing a bright yellow clay with the meal. Some of these meals were known in the trade as "Sea Island" cotton seed meal, and others were sold without any brand. These adulterated cotton seed meals, instead of carrying forty-three to fifty three per cent. protein, had only from twenty to thirty per cent. protein. Goods of this type were very abundant in Maine in 1897, but there is almost none of them to be found at present. The inspection law has driven them to other States. The chief chemist of the Rhode Island Station in a letter to the writer last summer, said: "I regret to say that Rhode Island has become the dumping ground of adulterated cotton seed meals, etc." At about the same time the chemist of the Massachusetts Experiment Station found large quantities of adulterated cotton seed meal being offered in that State.

It is the belief of the writer that all the principal manufacturers and dealers are reliable men, of strict integrity. The enforcement of the law was made on this assumption, and we have enjoyed the co-operation of dealers and manufacturers, as well as that of consumers. No case of wilful violation has come to our notice. On the contrary, there has been an evident desire on the part of most dealers to live up to all the requirements of the law. The law has come into effect without friction, and by another season it bids fair to be running as smoothly and as satisfactorily as the fertilizer law. It protects both the dealer and the consumer. It tends towards a more rational use of feeding stuffs, which will be alike beneficial to the feeder and the dealer.

WILL TUBERCULOUS COWS RECOVER?

For over six years the station has been studying tuberculosis from different standpoints. In the fall of 1895 a herd of ten cows and heifers that had reacted to tuberculin were placed in quarantine in a specially constructed stable at a distance from other buildings in order that the study of the progress of the disease might be extended over considerable periods of time. The stable was light and well-ventilated, the cattle were well fed and cared for. In summer they had the run of a small pasture with feed in the barn when it was needed. In winter they were not confined to the barn, but were turned out in a sunny yard during the middle of the day when the weather was such that they could be comfortable out of doors. The stable was well ventilated and the animals were not forced to production. Without using any elaborate or extraordinary means the endeavor was made to keep the animals under as healthful conditions as possible.

When placed in quarantine, none of the animals showed physical symptoms of being diseased, but, on the contrary, were as thrifty and vigorous looking animals as could be found anywhere. They were considered diseased simply because they had reacted to the tuberculin test. A thorough physical examination failed to reveal any symptoms of disease aside from a slight cough in the case of two or three of them, and these did not cough any more than many other cows that were free from tuberculosis as far as it could be revealed by the tuberculin test. While different experiments and observations were made upon this herd it may be interesting to note what effect, if any, the good hygienic conditions under which the herd were kept, had upon recovery from tuberculosis, or holding the disease in check. The animals are referred to here by number in which they were slaughtered.

No. 1 reacted to tuberculin August 13th, 1895. She was killed January 15th, 1897, at which time she had been diseased nearly one year and a half, although the disease had made little advance. Tubercular lesions of the right lung and two mediastinal glands were found. She had never exhibited any physical signs of disease; at the time she was killed she was decidedly fat. Two guinea pigs inoculated from her died from tuberculosis.

No. 2 was killed Feb. 27th, 1897. It had been over six months since she had reacted from tuberculin, but she had been coughing for over a year and had not been as thrifty as the rest of the herd. The autopsy revealed only a small area of diseased lung and two large lymphatic glands.

No. 3 was killed June 17th, 1897, in an advanced stage of tuberculosis.

No. 4 was killed July 1st, 1897. She was very much reduced in flesh and weak, and the autopsy revealed a large amount of tuberculous growth, but it was all apparently of recent growth. Three weeks before she was killed lesions of the lungs were detected by physical examination.

The other six animals of this herd were killed Oct. 12th and 14th, 1897, and the following conditions were noticed :

No. 5 had always been apparently well except that she reacted to tuberculin test. The only lesions found were in two lymphatic glands and they showed very slight evidence of disease. Guinea pigs inoculated from these glands and killed after nine weeks showed no evidence of disease. All the evidence we have, therefore, would seem to indicate that this cow has recovered from tuberculosis.

No. 6 had always seemed well except for a difficulty in breathing, which had been noticeable for six months before she was killed, and a cough which had been troubling her for over three months. The autopsy revealed lesion of the lymphatic glands and a few small tubercles scattered through both lungs. The lung tubercles had cheesy centres, and were evidently of recent growth.

No. 7 had never shown any symptoms of the disease except a slight unthriftiness. The lymphatic glands and both lungs were tuberculous.

No. 8 had always been well, the only lesion found was one cheesy mediastinal gland.

No. 9 had shown no symptoms of disease, the only lesion found was in one mediastinal gland.

No. 10 had always appeared to be well. Two mediastinal glands were enlarged and cheesy.

In his report, Dr. F. L. Russell, the station veterinarian, sums up the cases as follows :

" A study of these cases shows us that, kept under exceptionally good conditions as these cattle were, five of them kept the disease in check, so that it made practically no advancement. In the case of three others, but little advancement was made, while in two cases the disease had nearly reached a fatal termination when the animals were killed. On the whole we cannot see that the exceptionally good care that these animals received had any effect on the progress of the disease. It may have retarded the progress of the disease, but if so the fact is not sufficiently clear to lend much weight to the argument that tuberculosis can be successfully controlled by simply maintaining animals under good hygienic conditions. Twenty per cent. of deaths is probably as high a percentage as one could reasonably expect among ordinary tuberculosis herds kept under poor or only fair hygienic conditions, if, to begin with, all cases that presented any physical symptoms of disease were removed."

THE DIGESTION CO-EFFICIENTS OF MAINE GROWN FEEDING STUFFS.

It is a matter of every-day experience that only a part of the food eaten is actually used by the animal. It is, therefore, of importance in cattle feeding to have a knowledge not only of the chemical composition of a given food but of the amounts of the nutrients which are capable of being assimilated. It is not so much what an animal eats as that which it digests that is actually turned to account. As here used the term digestibility or co-efficient of digestion means the proportion of any given food or food constituent which is digested under usual conditions, without regard to the time needed or the ease of digestion. At the present time the value of any food used in cattle feeding is usually estimated by calculations based upon (*a*) more or less perfect knowledge of the chemical composition of the feeding stuffs—that is, the percentage of protein, fat, carbohydrates, including fiber, and the ash ; (*b*) upon the digestibility of these different ingredients in the class of food used as observed in actual feeding experiments; and (*c*) upon the amounts of the digestible nutrients as ascertained by feeding experiments and practical experience which are needed for the proper nutrition of animals of different kinds or fed for different purposes. Digestion experiments made upon crops grown in the northern and eastern parts of the United States are more nearly correct for Ontario than the more commonly used co-efficients obtained by experiments made in Germany. The results of all the digestion experiments made at the Maine station with Maine grown feeding stuffs during ten years are given in the table which follows :

A SUMMARY OF ALL DIGESTION CO-EFFICIENTS OBTAINED WITH SHEEP AT THE MAINE EXPERIMENT STATION.

	Number of animals.	Total dry matter.	Organic matter.	Ash.	Protein.	Fiber.	Nitrogen-free extract.	Fat.
		%	%	%	%	%	%	%
Blue joint (cut late in July)	2	39.9	41.8	10.0	56.5	36.5	43.2	37.0
Buttercup (in full bloom)	2	56.1	56.6	48.1	56.3	41.1	66.9	69.7
Barley hay	1	59.1	62.3	44.8	65.2	61.7	63.3	40.5
Clover hay (alsike mixed with a little timothy)	2	54.9	56.2	....	55.5	46.2	64.1	53.2
Clover, alsike	2	62.7	63.6	51.4	68.2	55.9	67.3	61.2
Clover, alsike in full bloom	2	61.9	62.7	53.0	64.0	51.0	74.1	35.1
Average 2 experiments, four animals	....	62.3	63.2	52.2	66.1	53.5	70.7	48.2
Clover, white in late bloom	2	66.0	66.6	58.5	73.2	60.6	99.5	50.6
Corn fodder, southern (immature, no ears)	2	64.8	67.2	34.9	58.1	74.6	64.5	68.8
Corn fodder, southern (immature, no ears)	2	69.4	70.6	57.4	65.4	74.2	69.5	70.9
Corn fodder, southern (immature, no ears)	2	63.3	62.8	43.1	63.4	65.7	61.0	59.0
Average 3 experiments, 6 animals	....	65.8	66.9	45.1	62.3	71.5	65.0	66.2
Corn, sweet, partially matured, slightly frosted	2	60.9	63.1	23.4	59.0	70.2	59.4	67.5
Corn, sweet, whole plant mature	2	69.7	73.5	39.4	61.8	76.7	72.1	76.9
Corn, sweet, whole plant, ears mature	2	70.9	72.7	44.0	71.5	74.6	73.1	77.0
Average 3 experiments, 6 animals	....	67.2	69.8	35.6	64.1	73.8	68.2	73.8
Corn, flint, partially mature, slightly frosted	2	70.2	72.4	44.2	63.6	79.8	70.3	71.6
Corn, flint, whole plant, ears glazed	2	70.6	72.4	52.9	61.8	75.6	72.6	70.2
Corn, flint, whole plant, ears glazed	2	72.7	74.2	50.7	67.6	78.6	73.8	64.7
Corn, flint, whole plant, ears just forming	3	69.8	71.4	54.7	70.4	72.3	71.3	67.3
Corn, flint, whole plant, ears partially glazed	3	69.7	73.6	20.0	68.6	70.7	76.7	73.7
Average 5 experiments, 12 animals	....	70.6	72.8	44.5	66.4	75.4	72.9	69.5
Hungarian grass, green	2	63.4	65.6	35.5	62.4	67.8	65.8	52.3
Hungarian hay, (grass dried)	2	65.0	66.3	47.4	60.0	67.6	67.1	63.8
Hay (mixed, timothy mostly)	3	55.0	57.0	27.8	44.4	52.5	62.3	38.9
Orchard grass past bloom	2	54.4	55.8	35.0	58.5	57.5	54.4	57.2
Oat straw	2	50.3	52.0	.....	.....	57.6	53.2	38.3
Red top, full bloom	2	57.6	59.3	24.3	60.4	61.2	59.1	44.2
Red top, full bloom	2	61.8	63.0	33.4	62.2	61.3	64.6	56.8
Average 2 experiments, 4 animals	....	59.7	61.2	28.9	61.3	61.3	61.9	50.5
Silage, southern corn, immature	2	63.2	66.3	14.9	46.6	73.9	65.6	65.3
Silage, southern corn, immature	1	64.4	65.8	48.2	64.8	66.7	65.4	67.8
Silage, southern corn, immature	3	63.6	64.8	49.6	59.9	67.5	64.1	67.9
Average 3 experiments, 6 animals	....	63.7	65.6	37.6	57.1	69.4	65.0	67.0
Silage, flint corn, partially mature	2	69.1	72.1	12.3	52.9	75.2	73.4	82.6
Silage, flint corn, whole plant, ears partially glazed	1	78.0	80.2	41.3	68.0	77.9	83.1	80.9
Silage, flint corn, whole plant, ears partially plazed	1	76.0	77.9	36.6	73.3	77.8	78.5	80.9
Silage, flint corn, whole plant, mature	3	75.7	77.9	39.8	67.4	78.5	78.9	87.1
Average 4 experiments, 7 animals	....	74.7	77.0	32.5	65.4	77.4	78.5	82.9
Silage (mature flint corn, sunflower beads horse beans)	2	65.6	67.8	41.1	62.7	60.1	72.4	76.7
Silage (mature flint corn, sunflowers, whole plant horse beans)	2	65.5	69.5	25.6	58.0	65.3	73.7	74.1
Silage (Sandford corn)	2	69.9	72.5	34.4	56.3	72.1	75.6	72.9
Timothy hay (fed with corn meal)	1	.....	57.7	.....	43.0	50.5	65.6	42.8
Timothy hay (fed with cottonseed meal)	1	.....	61.2	.....	41.1	.....	65.6	54.6
Timothy hay (fed with corn meal)	1	.....	59.1	.....	42.1	53.6	66.1	45.5
Timothy, two weeks past bloom	2	51.6	52.4	.....	45.2	42.8	58.9	55.0
Timothy, in full bloom	2	65.7	66.8	41.8	60.4	62.1	71.8	51.5
Timothy, past bloom	2	54.1	55.5	28.0	44.5	51.0	61.0	34.6
Timothy, early, cut July 9	2	60.4	61.1	48.2	58.9	58.7	63.7	56.9
Timothy, late, cut July 24	2	58.3	59.4	32.2	50.0	53.3	63.9	58.3
Timothy hay	2	58.5	60.1	29.6	44.1	56.4	63.6	74.3
Timothy hay	2	59.1	60.2	39.7	47.5	54.8	64.7	69.8
Timothy hay	3	53.7	55.0	29.4	45.2	48.7	60.7	50.6
Average 11 experiments, 20 animals	....	57.7	59.0	35.6	47.5	53.2	64.1	54.0
Wild oat grass in bloom	2	68.3	69.1	52.2	68.0	70.6	68.8	62.8
Wild oat grass in bloom	2	59.6	61.2	17.1	48.6	65.1	62.1	38.2
Average 2 experiments, 4 animals	....	64.0	65.2	34.7	58.3	67.9	65.5	50.5
Witch grass	2	59.9	61.0	40.3	64.2	67.6	62.1	60.0
Witch grass	2	62.4	63.6	41.5	52.9	57.9	69.0	54.5
Average 2 experiments, 4 animals	....	61.2	62.3	40.9	58.6	62.8	65.6	57.3

A SUMMARY OF DIGESTIVE CO-EFFICIENT.—*Concluded.*

	Number of animals.	Total dry matter.	Organic matter.	Ash.	Protein.	Fiber.	Nitrogen-free extract.	Fat.
ROOTS.		%	%	%	%	%	%	%
Beets, Mangels	2	78.5	84.8	16.4	74.7	42.8	91.3	......
Beets, sugar	2	94.5	98.7	31.9	91.3	100.7	99.9	49.9
Potatoes	2	77.0	78.4	.....	44.2	......	90.9	13.0
Turnips, English flat	2	92.8	96.1	58.6	89.7	103.0	96.5	97.5
Turnips, rutabagas	2	87.2	91.1	31.2	80.3	74.2	94.7	84.2
MILL PRODUCTS.								
Corn meal (fed with hay)	3	93.3	93.6	61.9	78.7	......	98.5	92.5
Corn meal (fed with hay and skimmed milk)	3	89.6	90.7	49.5	76.9	....	95.3	98.1
Average 2 experiments, 6 animals	....	91.5	92.2	55.7	77.8	......	96.9	95.3
Gluten meal	2	87.4	89.1	.....	86.6	...	90.8	87.8
Pea meal	2	86.8	87.9	43.7	83.2	25.7	93.6	54.6
Wheat bran	2	58.8	62.8	.....	73.7	...	67.5	82.6
Wheat bran	2	59.8	64.0	......	82.1	36.2	64.1	64.0
Average 2 experiments, 4 animals, wheat bran	....	59.3	63.4	......	77.9	36.2	65.8	73.3
Wheat middlings	2	74.9	77.2	......	78.9	......	82.6	85.1

THE MICHIGAN EXPERIMENT STATION FOR THE YEAR 1897.

PREPARED BY C. D. SMITH, DIRECTOR.

In the line of pig feeding a long list of experiments culminated. It was shown that when pigs sold at $3.80 per hundred pounds skim milk was worth as pig food, when fed alone, not less than 17 cents per hundred weight; when fed with cornmeal to pigs weighing about ninety pounds at the beginning of the test the skim milk was worth nearly 28 cents per hundred pounds, reckoning the cornmeal fed with it at $16.00 per ton. Whenever used as one element of the ration of pigs, skim milk showed its extreme value. Calves took more milk and less grain for a hundred pounds gain than did pigs weighing about fifty pounds at the beginning of the trial. It may be of interest to the patrons of creameries to remember that in our experiment the pigs required on the average 857 pounds of skim milk plus 225.5 pounds of grain to make a hundred pounds of gain, while the calves required 1,431 pounds of milk, 42 pounds of grain and 28 pounds of hay to make a hundred pounds of gain. The grain ration in both cases consisted of a mixture of one part oil meal, two parts oats and two parts bran, fed dry. The hay was clover hay. Corn proved to be the best single grain to feed with milk to fattening pigs.

Much attention has been given at the Michigan Experiment Station to a careful study of the food requirements of dairy cows when developing, and when in full milk. Definite data to establish the proposition cannot be given but the experience as a whole indicates clearly the advisability of continuing the grain feed through the summer with dairy cows from which a large record is expected. A careful study of the feeding of the somewhat famous dairy cows which constitute the College herd showed that they did their work on a ration, the chemical composition of which was somewhat less than is recommended by either Armsby or Woll. A thousand pound cow in the fourth month after calving yielding on the average 1.21 pounds of fat daily, requires 23.57 pounds of dry matter, 206 pounds of digestible protein, 12.50 pounds of digestible carbo-hydrates and .89 pounds of digestible fat.

Sorghum and Kaffir corn yielded less valuable feeding stuff per acre than did corn similarly situated, and neither proved in these experiments to be valuable substitutes for corn. For soiling crops sorghum seems to do fairly well, but is in no way to be preferred to Stowell's Evergreen corn, followed by the usual field varieties.

Corn is the principal cattle food in Michigan, and many experiments were performed with this crop. Among the interesting results obtained the following are worthy of note by Canadian dairymen. A difference of 11 per. cent in yield of corn on two adjacent acres was noted in favor of the crop grown from seed produced in a year where the crop ripened well over the yield from seed grown a year later, but in a wet, cold season. The rule should, therefore, always be adopted that enough seed for at least two years' planting should be saved in our northern latitudes when the season is particularly favorable and the crop is unusually well ripened. It was shown also that the seed should be thoroughly dried before hard frost and freezing weather set in in the fall.

For the silo the corn may well be planted in drills about three and a half feet apart, the kernels being from two to six inches apart in the row. The heaviest yield per acre of green forage was harvested from an acre sown with a grain drill, every tube sowing, but when we come to consider the yields of protein and other valuable food ingredients per acre we find that where the corn is planted less thickly the yields are much greater. After testing the matter for several years in succession, and remembering that the variety of the corn must be considered, the station recommends that, for the silo, corn be planted a little thicker than for husking, say on the average, if in hills, not more than three feet and six inches apart each way, four kernels to a hill, or if in drills three feet and a half apart with the kernels every six inches.

When the corn is ready to harvest for the silo it was found that the maximum yield of dry matter and nutrients is obtained by allowing the crop to mature until the ears are well glazed, the earlier ones being fully hard and dry. Between the time when the kernels begin to glaze and full ripeness there is a gain of over one-eighth in dry matter, one-sixth in storch and sugar, and one-fifth in fat. The study of the losses in the silo show that there is a danger in allowing the corn to stand too long, especially in hot and dry weather, making the silage too dry to secure proper fermentation.

When the corn is ripe, about a half of the valuable dry matter is in the ear, less than a third is in the stalk, and about one-fifth is in the leaves. This fact shows the importance of preserving the leaves and stalks, which contain nearly half of the valuable food elements of the corn plant.

The next most important fodder plant for dairy cows in Michigan, and Canada as well, after corn is clover. The crop is valuable not only because the hay is exceedingly palatable to cows, is rich in protein and a well balanced ration in itself, but also because, through the decay of its roots, it leaves in the soil a vast amount of nitrogen, potash and phosphoric acid. On a sandy knoll a heavy crop of clover was growing in the summer of 1897. By digging away the earth to a depth of four feet, about a section of this growing crop, and washing away the soil from the roots of the clover it was possible to determine the amount of fertilizing constituents in the tops and roots respectively. It was found that on an acre of clover in full bloom there were 132 3-10 pounds of nitrogen in the clover tops and 62 pounds in the roots; of potash there were 97 pounds in the tops and 46.5 pounds in the roots; of phosphoric acid there were 36 pounds in the tops and 32 pounds in the roots. It would require not far from seven tons of good barn yard manure per acre to furnish the elements supplied by the decaying roots. The experiment shows, farther, the folly of selling clover hay. Alsike clover yielded well on moist ground and is suggested for such places. Peas sown alone or with oats made an excellent cow feed when green, and fair silage. The per cent. of dry matter in the pea silage when fed was nearly fifty and its per cent. of protein fully four and one-half.

An examination of eighteen samples of bran derived from different sources demonstrated that the prejudice existing against roller process bran was not well founded, and that the coarser brans are on the whole equally as nutritious as the finer samples. Gluten meal was found to be very variable in composition, according to the process of manufacture. When farmers can obtain it at a low price it is an excellent food for dairy cows, except that it made the cream somewhat harder to churn.

A dairy barn built during the season is equipped with two kinds of stalls, both of which keep the cows almost perfectly clean, which is a prime essential, whether the milk is to be made into butter or cheese. One stall is the Bidwell, made by Porter Bidwell, of McGregor, Iowa, and the other, the so-called Hoard stall, frequently described in the agricultural press. Our experience leads us to recommend both kinds.

Where clover was sown each month in the year the crop has been better from the seedings of March, February, January, April and November, about in the order named. Clover has been sown without a nurse crop with good success, the weeds being cut with a mower, set high, once or twice during the season. This method is recommended where it is important to have a catch. Alfalfa has not proved successful.

Much attention has been paid to the study of tuberculosis in cattle, but with few striking results, In one case where half of a litter of pigs were fed tuberculous milk for four days, the other half being kept free from the infectious material, it was found after the lapse of six months that every pig fed the diseased milk was tuberculous and not one from which the milk was kept was at all diseased. Calves fed milk from tuberculous cows grew up healthy, except that where turned with a certain cow and left associated with her day and night they contracted tuberculosis. An examination of the solid excrements of this cow demonstrated the presence of the germ of the disease. The bacilli were also found in the material which she coughed up. It is supposed that the calves may have been infected from one of these sources. Cows pronounced by the tuberculin test as certainly diseased in the spring of 1896, seemed to be recovering from the disease and are improving in physical condition. Caution in interpreting the results of the tuberculin test is suggested by the fact that when the normal temperatures of the large herd of nearly sixty animals were taken hourly for two successive days without the injection of tuberculin in the intervening night it was found that there was a variation of from one to three degrees—the variation in several cases being enough to condemn e animal had tuberculin been injected.

Without carelessness on the part of the dairyman, a dairy near the College became infected with ropy milk. The specific germ causing the trouble was detected, isolated and described. Thorough disinfection of the premises, cows and utensils resulted in a disappearance of the trouble.

In studying the pasteurization of milk it was found that in the udder of our healthy cows the milk was practically germ-free. The sources of the deleterious germs which it is the aim of pasteurization to kill were found to be chiefly in the stable, by filth falling into it from the cow and by currents of air bringing particles of dust laden with bacteria. Emphasis had to be laid on thoroughness in washing, scalding and steaming the milk utensils to prevent infection from them.

Time and space does not permit even mention of the work done in other departments of the Station. The discovery of the presence of San Jose scale in many places of the State required much of the energy of the horticulturist and entomologist in its suppression. The extreme high price of Paris Green and its frequent adulteration called for some equally efficient but cheaper insecticide. Boiling arsenic with lime in the requisite proportions provided just the material needed at the opportune time.

THE HATCH EXPERIMENT STATION, AMHERST, MASS.

Prepared by J. B. Lindsey, Director.

The Hatch Experiment Station (named after Congressman Hatch of Missouri) situated in Amherst, Massachusetts, is really a combination of the old Massachusetts Experiment Station established in 1883 and the Hatch Experiment Station founded in 1887. The Union of the two stations was brought about in 1895 with H. H. Goodell, LL.D., as director. This Experiment Station is divided into seven distinct departments: 1. Agriculture; 2. Botany; 3. Fertilizer Chemistry; 4. Foods and Feeding; 5. Horticulture; 6. Entomology; 7. Meteriology. The work of these several departments has a threefold division, namely, information, control work, and direct investigation.

All farmers in the State are invited to address the several departments of the station, inquiries relative to any branch of agriculture, and as full information as possible is forwarded to them free of cost.

By control work is meant the inspection of fertilizers and cattle feeds, the analyses of well waters and dairy products, and the identification of injurious insects and fungous diseases.

Work of investigation is meant to include experiments along different lines, with a view to solving many of the more pressing practical problems of the present time, and also long continued investigations involving much careful scientific research, for the purpose of ascertaining the true principles which underlie plant and animal life and development.

In the article which follows, I desire to refer especially to some of the work accomplished and in progress in plant and animal nutrition.

As is perhaps well known, very large quantities of commercial fertilizers are sold yearly in Massachusetts. The most of these consist of mixtures containing nitrogen, phosphoric acid and potash. Considerable quantities of the various single ingredients (i.e. nitrate of soda, muriate of potash, etc.,) are also purchased by farmers who wish to mix their own fertilizers. The work of inspecting these materials is carried on at the station under the supervision of Prof. C. A. Goessmann. During the year 1897 some some two hundred and ninety distinct brands were licensed in the State. The results of these analyses are published in separate fertilizer bulletins. Owing to the strong competition, as well as the low prices obtained for all agricultural producte, farmers are being obliged to give a great deal of careful study to the cost of plant food, and are yearly asking the station more thoughtful questions about the kinds of plant food best adapted to different soils and crops, and how they can be obtained at the least possible expense.

In connection with some experiments in plant nutrition with various fertilizer mixtures, Prof. Goessmann has recently called attention to the injurious effects of sulphate of ammonia and muriate of potash when used for any length of time on the same land. A chemical transformation appears to take place in the soil, forming a sulphate of potash and muriate of ammonia. The latter being a plant poison, produces a noticeably injurious effect upon crop production. Another point that has been noticed is, that many chemicals, but more especially muriate of potash, after continued using, tends to exhaust the soil of its available lime supply. The muriatic (hydrochloric) acid of the muriate of potash combines with the lime, forming muriate of lime, which being very soluble, is carried down through the soil and lost. These changes have been especially observed upon a field that has been under observation for ten years or more. Clover sown upon land thus treated would not grow. The soil has recently been thoroughly limed, and will now be sown to clover, and very beneficial results are looked for. The secret of success in clover-growing the writer believes to consist in supplying plenty of potash and lime, together with a reasonable supply of moisture.

A series of experiments with different forms of phosphoric acid which have been in progress for a number of years, are now sufficiently far advanced to begin to show results. The object of these experiments has been to compare the economy of phosphoric acid in a soluble form (dissolved bone black) with that in the so-called Thomas slag, and in the natural phosphates such as South Carolina floats and Mona guano.

The phosphates were applied to the different plats on the basis of their different money value, and at the end of four years plat 1 had received 78 pounds of phosphoric acid from phosphatic slag; plat 2, 55 pounds of phosphoric acid from Mona guano; plat 3, 151 pounds of phosphoric acid from Florida phosphate; plat 4, 126 pounds of phosphoric acid from South Carolina phosphate; and plat 5, 32 pounds phosphoric acid from dissolved bone black. With the beginning of the fifth year no more phosphoric acid was applied, while the yearly application of nitrogen and potash was doubled.

During the first two years the plat containing the dissolved bone black produced the better results, while in the succeeding four years the natural phosphates gave superior yields. The teaching of the experiment thus far seems to be that while soluble phosphoric acid produces more *immediate* results, that by applying the same money value of natural phosphates each year, the soil will become sufficiently stocked with phosphoric acid to yield yearly a sufficient amount available, to meet the wants of the growing crop, producing an even larger yield than from an equivalent money value of soluble phosphoric acid.

The economy of this will depend to a considerable extent on the price at which natural phosphates can be purchased. The tendency of manufacturers is to hold these articles at relatively high figures, and to dispose of the manufactured superphosphates. Soluble phosphoric acid from dissolved Carolina phosphate can be purchased at quite low figures at the present time. Thomas slag has shown very favorable results. Its large percentage of lime will make it a valuable product for use on sour soils. It will in all probability soon be imported into the States in large quantities, and be sold at very reasonable figures, and will furnish one of the most economical forms of phosphoric acid.

A series of experiments has been in progress for a number of years to test the values of different forms of nitrogen and potash. No stable manure has been applied, the crops depending entirely on the different commercial substances. The sources of nitrogen have been nitrate of soda, sulphate of ammonia and dried blood, the potash being supplied in the form of the muriate or the sulphate. The early application of plant food has consisted per acre of 50 pounds of available phosphoric acid, 60 pounds of nitrogen, and 120 pounds of potash. The garden crops have consisted of lettuce, spinach, beets, tomatoes, cabbage, potatoes, beans, sweet corn and onions. Sulphate of potash combined with nitrate of soda has given in every case but one (onions) decidedly the best returns, while sulphate of ammonia in combination of muriate of potash has shown the least satisfactory results. The probable reason of this has already been explained.

One reads in Griffith's Treatise on Manures, of the value of sulphate of iron as a fertilizer. This chemical has been tested at the Station for two years, but no satisfactory results have been observed from its use.

Nitragin is the name given to pure cultures of bacteria which work in the roots of various leguminous (pod bearing) plants, and enable them to take their nitrogen from the air. These pure cultures are prepared in Germany according to directions furnished by Messrs. Nobbe and Hiltner, and are intended to be spread on the land where a leguminous crop is intended to be grown. The soil is thus inoculated with the bacteria particularly adapted to the crop under cultivation. Nitragin has been tested for two seasons at our Station upon crimson clover, red clover, and alfalfa, without any apparently beneficial results. It is probably that the soil was already stocked with the bacteria peculiar to these crops. It is possible that nitragin will prove more particularly valuable when attempting to grow a leguminous crop new to a locality.

The Station has carried on variety tests with some eighty different kinds of potatoes. The largest yields in order of their productiveness are as follows :—Rose No. 9, Restaurant, Woodbury's White, Bliss Triumph, Prolific Rose, Empire State, Early Maine, Dakota Red, Sir William, Early Rose, and Beauty of Hebron. Each of these varieties yielded at the rate of over 220 bushels of marketable potatoes per acre. It will be noticed that the two old standard varieties, Early Rose and Beauty of Hebron, ranked among the most productive.

The varieties of corn best suited to our localities have also been studied. Of the flint varieties the Sanford, Compton's Early, Giant Long White, and Longfellow are to be commended, and of the dent varieties Yellow Rose, Mastodon, Reed's Yellow Dent, New Golden Triumph and Leaming. Sibley's Pride of the North on account of thorough maturity, is also a very desirable variety, and one quite generally grown at the Station.

A very desirable leguminous crop for green manuring seems to be the so called sweet clover (Melilotus alba). Early in July it reaches nearly six feet in height, and yields from 10 to 15 tons of green material per acre. The bacteria nodules develop quite freely in the roots. On account of its coarseness, and its rather pronounced flavor, it is not particularly adapted for a forage crop.

A very interesting series of experiments conducted by Prof. Brooks have been under way for a number of years. The object has been to note the preferences of different plants and groups of plants for certain forms of plant food. These results will soon be published in bulletin form.

This Station devotes considerable time to the study of the value of cattle feeds and to problems with annual nutrition. The Station is about to erect a creamery for the investigation of questions connected with butter making, and the effect of feeds upon the quality of butter.

The Station has been instrumental in securing the enactment of a feed law. Beginning with July 1897 all so-called concentrated cattle feeds were subject to an inspection. About six hundred different samples have been thus far collected from all over the State, and the results published in especially prepared bulletins, Cotton seed meal has been found to be quite seriously adulterated, and special circulars concerning this condition have been sent out to the various local newspapers, and to all grain dealers in the State. Not only has the Station *analyzed* all the so-called feed stuffs, but it has subjected many of these to digestion tests with sheep, and has brought together its results in the form of a table showing the comparative values of the different feeds. This table together with a few remarks of explanation is given below.

COMPARATIVE COMMERCIAL VALUES OF CONCENTRATED FEEDS.

Starchy (carbohydrate) feeds.	Corn meal	100
	Hominy meal or chop	100
	Cerealine feed	100
	Chop feed	85*
	Quaker oat feed	85
	Oat feeds (excessive hulls)	75
	Victor corn and oat feeds	95
	H. O. horse feed	95
Protein feeds.	Wheat bran	85
	Wheat middlings	100—110**
	Mixed feed	100*
	Dried brewers' grains	100
	Malt-sprouts	100
	H. O. dairy feed	103
	Buffalo and Golden gluten feeds	125
	Other gluten feeds	120
	Gluten meals	152
	Cleveland flax meal	138
	O. P. linseed meals	135
	Cotton seed meal	152

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* Estimated but not actually determined.

** The 110 value refers to fine light-colored middlings with 19 per cent. protein.

The above feedstuffs are divided into starchy and protein feeds. The former are purchased primarily to increase the digestible matter in the daily ration, while the latter are brought not alone to give more digestible material but to increase the *protein*, in the ration feed to the animal.

It is not possible in this connection to show the relative effects of the various feed stuffs on the flow of milk or the production of beef. The figures are offered rather as a key to the *comparative commercial values* of the different feeds based on the nutrients contained in them. Thus if corn meal is worth 100, Quaker oat feed would be worth 85; or if wheat bran is worth 85, cotton seed meal would be worth 152. These figures can be easily converted into dollars. Thus if corn meal is worth $16 per ton or 100, Quaker oat feed would be worth 85 per cent of $16 or $13.50, the amount the farmer can afford to pay for the oat feed. Again with cotton-seed meal worth $22, what can the farmer afford to pay for old process linseed meal? Cotton-seed meat equals 152, or $22, and linseed meal 135 or $19.60. We have a case in simple proportion. 152 : 135 : : $22 : x = $19.60, the value of a ton of linseed. It must not be forgotten that these figures do not take into consideration the mechanical condition, or the particularly favorable effect which some feeds are supposed to exert upon the general health of the animal.

As our system of farming in the eastern States becomes more intensive, we are finding it advantageous to resort at least to a partial system of summer soiling for our dairy herds. Corn ensilage is advocated by many for this purpose, but while the writer is in favor of a reasonable amount of ensilage as a winter feed, he much prefers green crops for summer use. The Station has devoted considerable time to this problem. The arrangement of soiling crops which follows is proving quite satisfactory with us.

Ten Cows—(entire soiling).

Kind.	Seed per acre.	Time of seeding.	Area.	Time of cutting.
Orchard grass Alsike clover	12 lbs 12 lbs	Aug. 1	⅔ acre	June 10-20.
Peas and oats	1½ bush. each	April 20	½ "	June 25, July 7.
" "	1½ " "	May 5	½ "	July 7, July 19.
" "	1½ " "	" 15	½ "	July 19, July 31.
Vetch and oats	60 lbs 1½ bush	April 20	½ "	June 25, July 7.
Barnyard millet and peas	1 peck 1½ bush	May 12	⅓ "	August 1-10.
Barnyard millet and Soy beans	1 peck 18 qts	June 15 May 20	⅓ "	" 10-20.
Indian corn and Soy beans	3⅓ ft. drills between corn	" 20 " 20	⅓ "	" 20-30.
Indian corn and Soy beans	3⅓ ft. drills between corn	June 10 " 10	½ "	September 1-15-
Millett and peas	1 peck 1½ bush	July 15	⅓ "	" 15-25.
Barley and peas	1½ " 1½ "	" 25	⅔ "	October 1-20.

It is quite probable that Canadian farmers will not find it necessary to follow this exact arrangement, nor to depend upon soiling during the entire season. It is, however, of great advantage to be able to supply green feed during July, August and early September, as an abundance of feed during that time will return a good profit. The area to be devoted to each crop can be modified to suit the needs of individuals, depending upon whether the animals are to be fed entirely on these crops, or whether they are simply to help out the pasture.

Remarks on the Crops. It has been our object to cultivate the non-leguminous and leguminous crops together, thus securing a feed with a larger amount of protein than would be furnished by a grain crop alone. Of the non-legumes, the barley, oats and corn are well known. They are, so to speak, carbohydrate crops, furnishing an insufficient supply of protein for dairy stock. The barnyard millet (Panicum Crus galli) is of the same nature. It is a Japanese plant, being the cultivated species of the common barnyard grass. It will yield twelve tons of green feed to the acre on ordinary good land, but needs a reasonably moist soil. We would not advise sowing it on lands sensitive to drouths.

Of the leguminous crops, the clover, peas and vetch are well known. We prefer the alsike clover on account of its fine stems. The spring vetch is finer than the pea, but needs a moist soil to do well. It fails with us during a dry season. The vetch seed is also more expensive than the pea. The Japanese Soy bean has proved quite satisfactory. The medium green variety is to be very much preferred. It is quite a foliaceous plant, and will grow three and a half feet high without any support.

Remarks on Planting. In case of peas and millet, the peas are lightly plowed or deeply harrowed in, and the millet then sowed and put in with an acme or similar harrow.

In planting the millet and beans, we first sow the beans in drills, the latter two and a half feet apart, and the beans being one to two inches apart in the row. A corn planter is used for this purpose. After about three or four weeks, the beans having been freed from weeds, millet is sown between the rows and lightly harrowed in. The two will be ready to cut at the same time.

In case of the corn and beans, we sow both at the same time, putting the corn in hills three and a third feet apart each way, and planting a hill of beans between each hill of corn. The beans can be put in with a hand corn planter. Both of these crops will be ready for feeding at the same time. It is best not to cut until the corn is in the milk, but for the sake of succulency it might be wise to begin rather before that time.

We have carried out a number of very carefully conducted experiments to see if it would be possible to increase the fat contents of milk by certain feed combinations, but find it impossible by normal feeding with ordinary feeds to do this. It is possible that it can be done by feeding certain materials, but we are not sufficiently far advanced to make any definite statements.

European investigators have for a long time recommended that the rations of an ordinary milch cow producing ten to fourteen quarts of milk daily, should contain about sixteen pounds of total digestive materials, of which two and one-half pounds should be protein. This ration has been more or less criticised by many, and a so-called American ration proposed, containing two pounds of digestible protein daily. We have made a number of experiments along this line of enquiry. Our aim has been to feed each animal a total of sixteen pounds of digestible matter, and to vary the amount of protein from 1.5 to 2.5 pounds per day. We find that when but 1.5 pounds of protein are fed, the animal yields about ten per cent. less milk, and when two pounds are fed, five per cent. less milk, than when the animal receives 2.5 pounds digestible protein daily. An animal receiving but 1.5 pounds per day, will also—if she is naturally a good milk producer—grow thin in flesh. Two pounds of protein daily in a ration containing sixteen pounds of total nutrients, is a reasonably good supply for an animal yielding ten to fourteen quarts of milk daily. For an animal yielding fifteen to twenty quarts of milk per day, two and one-half to three pounds of protein are necessary. It is largely a question of economy whether the daily ration shall contain two or two and one-half pounds of protein. If protein feeds are costly, and carbohydrate feeds cheap, the farmer will naturally feed but two pounds. On the other hand, if as is often the case, protein feeds can be bought practically as cheap as the carbohydrate, the feeder can arrange his rations so as to feed two and one half pounds daily with profit. When practically all the grain is raised upon the farm, the farmer will not be able to combine his rations so as to secure more than two pounds of protein per day, without he purchases some feed especially rich in protein such as cottonseed or gluten meal.

NEW JERSEY EXPERIMENT STATION.

Prepared by Edward B. Voorhees, Director.

Although the New Jersey Experiment Station is pursuing a number of lines of work, all of which are of direct practical importance to our farmers, perhaps the one which is of the greatest immediate service is connected with the investigations in the dairy department. There are three prime factors entering into this :

First, the cow ;
Second, the food ;
Third, the relation of dairying to soil fertility.

1. *The Cow.* Concerning the cow, the studies made the past year are interesting in showing, first, the wide variation that may exist between the yield and composition of milk of individual animals, and, therefore, the necessity of a careful selection of animals in the building up of a new herd and the careful weeding out of animals in herds well-established ; and, second, that while there are two distinct classes of dairy animals, namely, butter producers and milk producers, there are animals that are extremely valuable because they possess both of these characteristics, or in other words, that it is possible to have these two characteristics combined in the same animal in a very considerable degree.

In reference to the first point, it was shown that in a herd of twenty-one dairy cows, the range in annual milk yield was from 4,413 pounds to 8,303 pounds, or a difference between highest and lowest of 3,890 pounds or eighty-nine per cent., and that the range in butter yield was from 202 pounds to 405 pounds, a difference of 203 pounds, or over 100 per cent.

In reference to the second point, it was shown that the best milk cow was the second best butter cow, and that the best butter cow was the fifth in order of milk yield.

It was further shown that the cost of the daily rations for the different animals did not vary widely, though those producing the larger yields consumed more, but not proportionately as much more their yields, and further that the increase in food to those animals consisted more largely of the cheaper roughage than the more expensive fine feeds. The importance of this point is clearly shown when values are fixed upon the produce. At one cent. per pound for milk the value of the product of the best cow was $83.03, while the value of the product of the poorest cow was $44.13. Or, in other words, the yield of the best cow was sufficient to pay for her feed and leave a balance of $40.69 in cash, besides manure to represent the cost of her care and the profit, while the yield from the poorest cow paid for her feed and left $1.79 besides manure to represent her care and profit.

In butter-making the fertility sold in the whole milk remains on the farm. This, together with the skim-milk, which is estimated by careful feeders to be worth twenty cents per hundred, is an offset against the extra labor required in making butter. The value of the product of the best cow in butter at twenty cents per pound was $81.08, or sufficient to pay for her feed and leave $38.74, in addition to skim-milk and manure, to represent her care and the profit, while the value of the product of the poorest cow was $40.43, which is $1.91 less than the cost of her feed, or the profit from this cow is represented by the manure made, less $1.91, and out of this must be taken the amount necessary for the care and labor required in her handling during the year.

It has been claimed that in the sale of milk under present conditions but little profit is derived from a cow that does not produce 5,000 pounds per year, and in the making of butter the minimum of yield in order to derive a profit must be 200 pounds, and the facts brought out strongly emphasize the correctness of these claims. In any case no stronger argument is needed for the necessity of testing animals and thus learn their exact value.

2. *The Food.* An experiment was conducted during the past year to study "the cost and feeding value of the dry matter of corn fodder and of silage," and the results showed that, while the cost of harvesting, storing and preparing for food the dry matter contained in corn was greater per unit of dry matter in the form of silage than in the form of dried fodder, the feeding value of the former was much greater than that of the latter. That is, the yield of milk from the same amount of dry matter in the form of silage was 12.8 per cent. greater, and the yield of butter fat 10.4 per cent. greater than when fed in the form of dried fodder ; and deducting the losses which occurred in the handling of the silage and dried fodder, it was found that at one cent per pound for the milk produced by the animals the value of the corn crop was $10 greater per acre when fed in the form of silage rather than in the form of dried fodder.

In another experiment, just now concluded and not yet published, in which a comparison was made of the use of green forage only (oats and peas), and green forage (oats and peas) plus feed in which the nutrients consumed in each case were practically identical, while the yield of milk was greater in the ration in which the feed was added to the green fodder, the cost of the milk was very considerably increased. That is, the increased yield was produced at a cost of about five cents per quart. The experiment showed not only that green forage alone may serve as an entire ration for dairy animals, but that it is a much cheaper summer ration than one which contains a considerable amount of feed in addition, thus furnishing inducements of the right sort to feed, if not entirely, as much as possible of home-grown produce. That this is practicable even without an abundance of pasture was also shown by a study of the soiling crops in 1897, when sufficient roughage for twenty-five cows for six months was produced from seven acres of land.

3. *The Relation of Dairying to Soil Fertility.* Third, in reference to the relation of dairying to soil fertility, it was shown by a comparison of the amounts of fertility constituents purchased in the feed and removed in the milk that in the handling and feeding of the dairy herd, there remained upon the farm in the manure :

Nitrogen	851 pounds.
Phosphoric acid	640 "
Potash	214 "

That is, notwithstanding the fact that dairy farming is exhaustive farming, if whole milk is sold, by the careful purchase of fine feeds, or rational exchange of farm produce for them, a very considerable increase in the fertility of the soil, rather than an exhaustion, will follow the practice. This latter point leads naturally to a study of the saving and handling of manures, which is now in progress.

There is, to be sure, nothing particularly new in the results here reported ; still, they are valuable in showing the necessity and the profit to be derived from a careful study of but three points connected with the dairy, but one branch of farming. Cumulative evidence of the dollars and cents value of observing the principles which underlie the business, as well as indicating that real profits lie in decreasing the cost of production and in improving the quality of the product, for which a higher price is received.

NEBRASKA AGRICULTURAL EXPERIMENT STATION, JANUARY 1, 1897, TO JUNE 1, 1898.

Prepared by A. L. Haecker and V. C. Barber, Lincoln, Neb.

Under the able directorship of Chancellor George E. MacLean the Nebraska Experiment Station has continued as heretofore to carry on various investigations along lines of interest to farmers, not only in Nebraska, but in other farming countries.

The Department of Agriculture is directed by Prof. T. L. Lyon, and embraces the work in field crops, cultivation of forage crops, dairying, dairy stock and the soil.

Corn.—Bulletin 54, by Prof Lyon, treating of the effect of certain methods of soil treatment upon the corn crop, was compiled with great care, and is a valuable treatise upon this subject. The average amount of rainfall in Nebraska is 23.47 inches per year, and although this is enough for the crop under average conditions there is sometimes a failure on account of the loss of moisture by evaporation from the surface of the soil. Various methods of retaining the soil moisture have been tried experimentally at the Station. The following are some of the results :

Subsoiling.—By the term subsoiling is meant loosening the lower soil to a depth of from twelve to eighteen inches, without bringing any of the lower soil to the surface. This method of treatment is found to be beneficial on the compact subsoil at the Station farm, but of no value on the light soils in the western part of the State. The following are the yields obtained on a subsoiled plat as compared with an adjacent one not subsoiled :

Year.	Crop.	Yield per acre from plat subsoiled.	Yield per acre from plat not subsoiled.
1895	Corn	26 bushels	0 bushels.
1896	Corn	56 "	37 bushels.
1897	Corn	44.5 "	40.5 bushels.

In another trial with corn on two plats the plowed piece yielded fifty-seven bushels to the acre, while the piece that was plowed and subsoiled yielded sixty-four bushels to the acre.

In the fall of 1896 certain plats were treated as above with the result that the plowed piece yielded thirty-two bushels per acre and the plowed and subsoiled piece thirty four bushels to the acre.

A trial was made during a very wet season which seemed to show no benefit from subsoiling. The plat that was plowed showed a yield of 68 bushels to the acre, the plowed and subsoiled plat 67.

On the other hand where trials were conducted on the lighter or loose porous subsoils of the western part of the State quite different results were obtained, as shown in the following :

Method of preparation of soil.	Yield of corn per acre.
Plowed eight inches deep	39 bushels.
" " " and subsoiled	21 "
" four " " "	21 "

From fifty nine replies to blanks sent out over the State regarding subsoiling it was brought out that on a large majority of soils having a clay subsoil it was beneficial to subsoil, while on land having a loamy subsoil it was found to have either no effect or to be injurious. Eighty per cent. of the subsoiling in the first instance was favorable in results, while only twenty-three per cent. shows favorable results in the latter case.

Fall *versus* Spring Plowing.—The relative value of fall and spring plowing in preparing the soil for corn is plainly shown in the table below :

Time of plowing.	Yield in bushels of corn per acre.
September, 25, 1895	75
April 2, 1896	56
September 10, 1896	75
April 2, 1896	55

The next year the plowing was done later in the fall and earlier in the spring. The noticeable difference in the yield is due to the less favorable year of 1897.

Time of plowing.	Yield in bushels of corn per acre.
November 1, 1896	32
April 8, 1897	30
November 1, 1896	39
April 8, 1897	38

Shallow *versus* Deep Cultivation During Growth.—A test to determine the relative value of shallow and deep cultivation was carried on in this manner. Four plats were selected on a level piece of ground having the same fertility and preparation for planting. When the corn was old enough three of the plats were cultivated to the depth of three inches and the other one to the depth of six imches. The following result was obtained :

Method of cultivation	Yield in bushels per acre.
Deep cultivation	59
Shallow cultivation	68
"	69
"	69

It might be well to mention here that the season of this trial was in a wet year, and the roots of the corn fed close to the surface so that in the case of deep cultivation many of the surface feeding roots were destroyed.

FORAGE. There has been an increasing demand in the west for more information regarding forage crops. The failure of our native grasses to afford succulent food during the hot dry months of August and September and the increasing amount of stock make it a question of great importance. These demands have led the station to carry on experiments pertaining to the production and feeding value of forage crops. Bulletin 53, by Prof. Lyon, was published in the spring of '98, giving some of the results of the previous years' work in forage, and containing suggestion as to their feeding value in this section of the country.

FORAGE FOR PASTURE. It seems possible to follow a system of summer feeding that will possess certain advantages over permanent pasture. This consists in planting annual plants that will serve as forage crops, and when they have attained a proper growth, allowing the cattle to pasture on them. This system may be used to supplement permanent pasture when it fails or to replace it altogether. It insures succulent fodder during the entire summer, and does not entail the expense of cutting and feeding the crop. It does, however, necessitate preparing the land for each crop, and increases to some extent the amount of fencing required. It also has one disadvantage that soiling does not possess, in that a portion of the crop is destroyed by the tramping of the stock. But this is much less than one would imagine.

In order to ascertain the amount of land required to support a cow during the summer, and thus to estimate the cost of feeding in this way, a cow was pastured during the summer on measured plats of land planted to rye, as representing early forage, and sorghum as representing a late one. The plats when pastured were fenced off by a temporary fence, and the animal kept within the enclosure during such a period as the crop afforded sufficient pasture.

The following table shows the length of the time that pasture was afforded by certain crops at different periods of growth.

——	Crop.	Height.	Pasture afforded on one acre.
Sorghum		2½ ft.	90 days.
"		3½ ft.	109 days.
"		4½ ft.	127 days.
"		5 ft.	127 days.
"	Heads formed		99 days.
"	Seeds ripe		72 days.
"	Second growth		136 days.

A large number of forage crops were grown in one-tenth acre plats in order to compare the rate of yield of green fodder. Many of these did not prove to be well adapted to Nebraska, and some contained so much weedy material as to make them unfit for forage, notably Saccaline and the Florida Beggar Weed. The crops that proved capable of making a healthy growth in this climate and soil, and at the same time proved to possess at least some value as forage, gave the table which follows:

	Pounds per acre.
Sorghum	34,281.
Red Kaffir Corn	24,060.
White Kaffir Corn	32,020.
Common Field Peas	7,650.
Hairy Vetch	13,000.
Burnet	10,300.
Jerusalem Corn	20,700.
Milo Maize	21,200,
Soy Beans	15,000.
Cow Peas	22,850.

This table does not indicate the relative value of these crops as articles of forage, nor does it indicate the amount of nutriment furnished, or the effect upon the milk flow, but will serve as a means of comparing their value as forage crops on the basis of yield per acre.

The forage work being carried on for this season is quite extensive, and will no doubt result in some valuable data in regard to the value of forage pasture for dairy stock. The entire dairy herd is being kept on different forage pastures, and not only the weights of the animals noted but also the production of milk and butter. Although this experiment has not been completed as yet, a few facts have already been noted, i. e., winter rye, oats and peas do very well for early spring pasture, sorghum and Milo maize for mid-summer, and sorghum and white Kaffir corn for late fall.

OTHER FORAGE PLANTS. In the spring of 1897 several hundred grasses were sent from Washington, D. C., with the view of securing a forage that would thrive with a small amount of rain-fall. "Bromus inermis" and "Boutelona racemose" are the two varieties which promise to be the best adapted to the semi-arid regions of this State. The former has proved an excellent horse feed, producing two and one-half tons to the acre. As a pasture for cattle it promises well. Extensive experiments with alfalfa have shown it to be a most thrifty plant for this region.

ANIMAL DISEASES. The Department of Animal Pathology, in charge of Dr. A. T. Peters, has been carrying on elaborate experiments with hog cholera, the object being to test the method of treatment with the so-called "antitoxin." The antitoxin is prepared in the following manner: A horse is inoculated with a virulent culture of the hog cholera germ at intervals of every few weeks, the dose being gradually increased until the animal is pronounced immune. The horse is then bled and the serum taken from the blood is the "antitoxin" used to treat the hog. The experiments here have shown that it takes a dose of from eight to ten c. c. to make a hog immune. This material is injected beneath the skin on the inside of the thigh. The present results show that this amount of serum injected alone produces an immunity lasting from six to eight weeks. Numerous experiments have been made in which one c. c. of a virulent culture of the hog cholera germ was injected in connection with the serum. In this way the period of immunity has been lengthened to at least three months, at the end of which time the operation must be repeated in order to insure the animal's safety against the disease. Up to February, 1897, 1,176 hogs had been treated with serum alone, resulting in the saving of 66%, all of whom had been exposed to the disease, and one-third of the entire number sick. Later results show that when the serum is injected in connection with the virulent culture, a much larger per cent. are saved, due to the period of immunity being lengthened. The exact data is not entirely at hand, but it suffices to say that the serum-culture results are much more gratifying than those from the use of serum alone. It only remains now to prove the practicability of the method, that is, whether the expense of preparihg the serum will warrant such a treatment.

HORTICULTURE.

Prof. F. W. Card, as head of the Department of Horticulture, has published bulletin 51, in which he discusses his observations on the coding moth.

THE CODLING MOTH (Carpocapsa pomonella L.) Prof. Card has made special observations on this most destructive of all insects, regarding its life history and habits, in order to thus cope with the pest. He sums up the life history somewhat as follows :—

The moth first begins to emerge late in May, and deposits its eggs chiefly on the upper surface of a leaf near by an apple. The eggs hatch in eight to ten days, more or less, according to the weather. The larva emerging seeks a hiding place, and the one most frequently available is that formed by the calyx lobes which have closed. It soon eats its way to the centre of the apple and becomes full grown in from ten to fourteen days more. It then usually leaves the fruit and finds a convenient hiding place in which to spin its cocoon. Such is commonly found beneath the rough bark of the tree. The larvæ apparently leave the fallen apples and crawl up the trunk, or they may leave the apples still on the tree and crawl down. Sometimes they change to pupæ within the apple. The second generation of moths appears in one month or a little more after the eggs are laid. The greater number pass through three generations. Few transform to pupæ after September first. Then they weave their thick cocoons, preparing to pass the winter. Those still in the apple may be harvested with the fruit and thus find a place for transformation in the crevices or among the refuse in the barrels and bins. The winter is passed in the larval stage, the change to pupæ being made in the spring, and then the summer campaign begins.

TREATMENT. From the knowledge at hand regarding the life history of the codling moth the following suggestions for treatment are offered :

1. Spray with Paris green, as generally recommended, about one week after the blossoms fall, or in time to get the caylx cups well filled with the poison so that they may close over and hold it there.

2. Spray again with Paris green and Bordeaux mixture combined, or with kerosene emulsion, about June 1st, or, better still, observe carefully and apply this when the eggs are laid in abundance on the leaves. Laboratory experiments indicate that kerosene emulsion will be more effective than Paris green at this time.

3. Scrape the bark and place paper bands around the tree about the last of June, when the larvæ are beginning to leave the apple to pupate. Examine these two or three times, a week apart, and destroy the insects found beneath them.

4. If these methods are not wholly effective, owing to the proximity of neglected orchards, or from an unusual abundance of moths, later spraying, with either Paris green and Bordeaux mixture, or kerosene emulsion, may do some good, but apparently cannot be expected to be wholly effective. Late spraying with arsenites is much more likely to injure the foliage than earlier applications, and if the other methods are closely followed it will probably be unnecessary.

5. If larvæ are still found in the apples in any considerable numbers towards the end of the season, place paper bands about the trees about September first, or a little earlier. Leave them there until the fruit is gathered from the orchard, then remove, and destroy the larvæ hibernating beneath them.

6. Screens placed over the windows and doors of the cellar or rooms where the apples are stored, will prevent those larvæ which are taken in with the apples from escaping as moths in the spring.

OHIO EXPERIMENT STATION.—THE COST OF RESTORING WASTED FERTILITY.

PREPARED BY CHAS. E. THORNE, DIRECTOR.

The Ohio Agricultural Experiment Station was for a number of years located upon the farm of the Ohio State University, within the corporate limits of the city of Columbus. In 1892 it was removed to Wayne county, and located upon a group of adjoining farms lying from one to two miles south of the city of Wooster. These farms had been entered during the first quarter of the century, at which time, no doubt, they were in unbroken forest. After the manner of the early pioneers they had been gradually cleared —a field here, another there—until by the time they came into the possession of the Station the fields most recently brought into cultivation had been cleared so long that the white-oak stumps had rotted away. The soil of these farms is a light, yellow clay, lying upon shaly sandstone. In the higher portions there is sand enough in the soil to permit the growth of the chestnut, but the timber is chiefly white-oak, with an undergrowth of dogwood.

For a time after the removal of the forest the soil was sufficiently drained by the decaying tree roots, passing through the clay sheet to the stratified rocks below; but with the progress of time these natural drainage channels have disappeared, obliterated by the annual scraping of the plowshare; so that, when the Station came into possession, underdrainage was seen to be the first thing necessary to successful crop production.

Two of these farms had been occupied by intelligent owners, since the forest was cleared away, and had been kept in fair condition by crop rotation and the use of manure; the third had been occupied by renters for nearly twenty years, under the improvident system of short term leases prevalent in Ohio, a system which encourages the tenant in his treatment of the soil to follow the maxim, "After us the deluge" Because of its evident poverty, this farm was selected for the experiments of the Station in the recovery and maintenance of fertility; portions of it, selected for apparent uniformity of soil, being laid out in plots for this purpose. These plots are 16 feet wide by 272½ feet long, containing one-tenth acre each, and are separated by dividing spaces two feet wide. Tile drains are laid under alternate dividing spaces, making the drains thirty-six feet apart. There are 150 plots in the test under consideration, divided into five sections, A, B, C, D, E, of thirty plots each, the sections being cropped in a systematic rotation of corn, oats and wheat, one year each, followed by clover and timothy two years. Every third plot is left continuously unfertilized, while fertilizers or manures of various composition are used on the plots between.

The farm was occupied by the Station in the fall of 1892. The next spring the drainage was done, and corn was planted on Section C. The planting was delayed by the drainage, and an unfavorable season followed, so that the crop was light. When the corn was harvested it was found that the yield on the unfertilized plots, after the first, ran between 19 and 22 bushels per acre, until plot 28 was reached, when it suddenly rose to 34 bushels. Upon inquiry of the former owners of the land it was found that a farm lane had at one time run across the field at the point now occupied by this plot, and though this lane had been abandoned and the land cultivated with the remainder of the field for 17 or 18 years, still there was enough reserve fertility left to show this great difference in yield after so long a time.

In the next crop, oats, plot 28 yielded 35.8 bushels, while the remaining unfertilized plots averaged 24.5 bushels. The climatic conditions of the winter of 1894-5 were such as to cause almost total destruction of wheat on this farm, the average yield on the first 9 unfertilized plots being but 2½ bushels per acre, ranging between 1½ and 3½ bushels; but on plot 28 it was over 7 bushels. In 1896 the clover yielded 1,400 pounds on the average of the 9 unfertilized plots, against 2,400 pounds on plot 28, and in 1897 the timothy yieldwas 2,560 pounds on the 9 plots, against 4,520 pounds on plot 28.

Taking the total produce for five years, and valuing corn at thirty-three and a half cents per bushel, oats twenty-five cents, wheat at eighty cents, straw and stover at $3.00 per ton and hay at $6.00 per ton, the yield on plot 28 has been worth at the rate of $53.08 per acre, and that on the average of the other unfertilized plots, $30.76 per acre. In other words, the original crop producing capacity of this land has been reduced by more than 40 per cent by the improvident system of husbandry practiced. What will it cost to restore this squandered fertility?

Plot 11 of this experiment receives, during the five years of the rotation, a total dressing of 480 pounds of nitrate of soda, 320 pounds of superphosphate and 260 pounds of muriate of potash, calculated to carry 75 pounds of nitrogen, 50 pounds of phosphoric acid and 130 pounds of potash per acre. This dressing is estimated to carry to each acre as much phosphoric acid and potash and half as much nitrogen as would be taken from the soil in a total increase of crop of 13 bushels of wheat, 27 of corn, 28 of oats and 4,000 pounds of mixed clover and timothy hay. At the current retail prices of the fertilizing materials used, the total cost of the application is $21. This treatment has raised the corn crop to 22.6 bushels per acre; the oats to 33.3 bushels, the wheat to 7.8 bushels, and the two hay crops to a total of 5,327 pounds per acre, the whole having a value at the prices given of $43.45.

The wheat yield, it will be noted, exceeds that on Plot 28, thus illustrating the fact, so strikingly brought out in the great Rothamsted experiments, that wheat cares little for humus if it can but get an ample supply of minerals and nitrogen in a quickly available form; but when we deduct the cost of the fertilizers from the total value of the product it will be seen that very slow and expensive progress is being made towards restoring the original fertility of the soil.

On Plot 18 of this test, barnyard manure is used at the rate of 8 tons per acre on the corn and wheat crops. In this case it was used on Plot 20 on corn, at the rate of 6 tons only, and on Plot 18 on wheat, at the rate of 8 tons, a slight change of plan having been made at the beginning of 1894. The total yield from the plots thus manured has been 23.3 bushels of corn, 24 bushels of oats, 6.4 bushels of wheat, 2,390 pounds of clover and 3,600 pounds of timothy, worth at the values given, $42.68, or within 77 cents of the total value taken from Plot 11. The yields are given in full in the following table:

Plot.	Corn, 1893.		Oats, 1894.		Wheat, 1895.		Hay.		Total value.
	Grain.	Stover.	Grain.	Straw.	Grain.	Straw.	1896.	1897.	
	bush.	lb.	bush.	lb.	bush.	lb.	lb.	lb.	$
28	34.0	1,940	35.8	1,505	7.25	715	2,400	4,520	53.08
Average unfertilized	20.1	1,363	24.5	1,127	2.51	237	1,389	2,558	30.76
11	22.6	1,430	33.3	1,485	7.83	657	1,747	3,580	43.45
18-20	23.3	1,500	24.0	1,632	6.42	745	2,390	3,600	42.69

If the manure be valued at the cost of hauling from the barnyard and spreading on the field—say 50 cents per ton,—the cost per acre of the 14 tons used thus far would be $7, and there would be a visible margin of net profit; but even on this basis there must be years of hard labor and expense before we shall again have the soil that was given free to our predecessors.

It must be remembered that in the comparisons here made we are not using a virgin soil as the standard, but a soil which has already been robbed of its fertility for half a generation.

An imperfect idea of the loss which the land had suffered before this test was begun may be gathered from the following:

In 1894 a tract of forest on one of these farms was cleared of the timber, the stumps being removed and these with the brush carried entirely off the land for burning, as it was intended to plot it, and burning on the land would have impaired its uniformity. In 1895 and 1896 this land was cultivated in potatoes, and in the fall of 1896 it was sown to wheat. The wheat yielded 34 bushels per acre, without fertilizers, while that on the unfertilized plots in the test above described averaged for the same season but 10.4 bushels, the same variety being sown in both cases. In 1898 this new land gave 3,470 pounds of clover hay, against 1,828 on the unfertilized plots of the older tract.

To bring up the yield of wheat on the old land to a point equal to that given by the new land required an application of fertilizers containing 240 pounds of nitrate of soda per acre, 160 pounds of acid phosphate and 100 pounds of muriate of potash, costing $9.70 per acre, at current prices of these materials, and following similar dressings on the corn and oats crops preceeding; but this large application of artificial fertility was followed by only 2,600 pounds of hay in the clover sown with the wheat, whereas the new land gave 3,470 pounds of hay in the corresponding crop without any fertilizer, thus illustrating the ephemeral effect of artificial fertilizers as compared with the fertility of a naturally rich soil.

Another of the points brought out by this experiment is that on the old fields, out of which the humus has been pumped by half a century's continuous culture of cereals and and timothy, it is now next to impossible to secure a stand of clover; whereas the new land gladdens the eye with the most luxurious crops of this fertility restorer.

Ohio farmers have long recognized the beneficent effect on the soil of clover; but, having no clear conception of the causes underlying this effect, they have used clover in too many cases without definite plan or system, and without that careful study of the nature and needs of this plant which is necessary to the highest success. Because wheat requires no humus in the soil, and in fact objects to an excess of this constituent, they have assumed a like taste for clover, whereas the opposite is true.

In the use of artificial fertilizers on wheat there is a small increase of vegetable matter in the soil, due to larger root growth of the wheat, and that of course favors the clover crop following; but no combination of chemicals has yet produced so large an increase of clover in our experiments as the natural manure of the barnyard.

The fertility of the soil is the result of countless ages of accumulations under natural processes.

Within the space of a lifetime a fertile soil may be robbed of half its plant producing capacity by an improvident husbandry.

The maintenance of the fertility of an unexhausted soil may not only be easy, but the methods employed to accomplish this end may bring increase of income more than sufficient to cover their cost. On the other hand, the recovery of the wasted fertility of depleted soil may approach in cost the ordinary value of the land.

RHODE ISLAND EXPERIMENT STATION.

Prepared by A. A. Brigham, Director.

The field experiments conducted by Dr. Wheeler, chemist, have developed in a most instructive and useful way. The study of the action of lime in certain soils, and for numerous crops, has yielded results which must prove of very great value in practical farming. It is now shown that thousands of acres in Rhode Island and hundreds of thousands of acres in the United States, may be greatly benefited by the action of lime. This does not signify that lime is necessary for all soils or all crops. It does mean, however, that this matter is so important that each farmer should ascertain whether his soil and his crops need lime, and particularly that he should learn with what fertilizers to apply the lime. It is upon acid soils that lime proves very beneficial. These include many upland soils. Dr. Wheeler gives two very easy methods for testing a soil for acidity, using materials which are readily obtainable for a few cents at any apothecary store.

These tests can be made as follows: A tablespoonful or more of soil is placed in a tumbler or cup and moistened with sufficient water to make the mass of about the consistency of a thick paste. It is best to allow it to stand for from fifteen to twenty minutes before making the test, though it may be made at once. With a knife blade part the soil and introduce one end of a slip of *blue litmus paper*, which may conveniently be about one-half to three-quarters of an inch wide and two inches long, press the soil about the paper and after from two to five minutes remove the paper without tearing it, rinse off the adhering soil with water and note whether it still retains a blue tint or has become positively red. If the paper has been strongly reddened it may be concluded that lime will probably benefit many crops which may be grown upon the soil. If the soil has a marked reddish tint, as is sometimes the case, it may be better to bring but one side of the paper in contact with it, and if a red color comes through to the other side it may be concluded that the soil is acid. In all cases care must be taken not to handle the end of the paper which is used for making the test, since the touch of the fingers may redden it, and thus one might be deceived.

In case a soil contains any considerable excess of carbonate of lime and magnesia, the humus is mostly combined with lime and magnesia, and in such a case if a teaspoonful of soil is stirred into a glass of water to which a few drops of *ammonia water* have been added, and the whole set aside for some hours, the liquid which remains at the top will be nearly colorless, but where lime and magnesia are lacking in a soil the liquid has usually a dark brown or black appearance, the intensity of color depending upon the amount of soil taken, and of course upon its need of lime.

If these tests prove the soil to be acid, or lacking in lime and magnesia, the farmer is earnestly advised to experiment on a small scale, further testing his soils. Take small plots of land, apply air-slacked lime at the rate of two tons per acre well worked in, and on similar plots use no lime. Apply on the plots of both series the usual fertilizer, and plant beets, timothy and clover or wheat. Some crops seem to thrive better in acid soils than in those which are alkaline or neutral, and the same is true of some of the diseases of plants. Among the grasses the red top and Rhode Island bent seem well adapted to growing upon acid soil, while Indian corn and rye appear to resent the too recent application of lime to the soil. Curiously enough the potato scab disease, if present in the soil, seems to be favored by liming. On the soil of our field plots neither clover nor wheat will grow successfully if liming of the soil is omitted. Very interesting is the effect of liming for muskmelons and watermelons, the former crop being increased in one experiment nearly five times and the latter being reduced nearly one half. The beneficial effect of applying wood ashes while in part due to the potash contained is without doubt due largely to the carbonate of lime also contained.

For a very full and plain statement of the practical results of Dr. Wheeler's experiments in regard to lime and liming, your readers are referred to Bulletin No. 46, and also to the Tenth Annual Report of the Rhode Island Agricultural Experiment Station, which can be obtained upon application to the director by any one sufficiently interested in the subject to send a postal card requesting the same. The Tenth Annual Report contains also the results of experiments up to date on the assimilability of various forms of nitrogen in connection with liming, and on the substitution of soda for potash.

Relative to the assimilability of nitrogen, it was found that on a very acid soil sulphate of ammonia worked like a poison instead of as an effective fertilizer. Where air-slacked lime was applied with sulphate of ammonia the nitrogen proved nearly as valuable as like quantities in the form of nitrate of soda. Dried blood, on the acid soil, yielded some nitrogen to the plants and proved its marked superiority to the latter. When used in connection with lime the nitrogen of the dried blood became nearly as effective as like amounts in the form of nitrate of soda, while nitrogen in the form of leather was very ineffective even when, by liming, the conditions for its nitrification were made as favorable as possible. These results show that upon an acid soil where nitrification progresses but slowly, much of the money invested in the best forms of organic nitrogen such as blood, meat and fish is practically wasted, and since these forms make up the major part of the nitrogen of most of the commercial fertilizers, the importance of testing soils for their acidity and supplying lime where needed, cannot be too strongly emphasized.

Relative to the substitution of soda for potash, Dr. Wheeler concludes as a result of four years' experiments, that soda when used without potash has steadily deteriorated in its action when compared with results from plots manured with potash but without soda. Where soda has been added in increasing quantities to a full potash ration, little or no benefit from its use has been derived. On the other hand, the addition of increasing quantities of potash to a full soda ration has, especially in the last two years, been attended with most marked gains. Where potash and soda have both been employed in varying amounts, marked evidence of benefit from soda is noticeable in the results for 1897, particularly where the potash ration was reduced to one-fourth of the maximum amount. There seems to be some doubt if it would prove an economical practice to reduce the supply of potash sufficiently to gain the greatest benefit from the soda, for by so doing the total crop seems to be seriously reduced. It may be possible that certain plants may be able to make use of soda without the danger just mentioned. This point can only be determined by further experimentation.

In the Horticultural Division, Messrs. Kinney and Adams found as a result of germination tests of 151 samples of garden seeds, that the vitality of 34 lots fell below 50%; that is, a purchaser in buying seeds of which these were samples, would receive less than half his money's worth of good seeds Second tests of 60 samples four months after the first tests showed as compared with the first tests in 30 samples a variation of less than 5%; in 10 samples 10%; in 8 samples 15%; in 9 samples 25%; in one sample 26%; in 2 samples over 35%. The suggestion is made that seedmen regularly and systematically test their seeds when in bulk, and furnish the purchaser a statement of the result of the test of such seeds as he buys.

Prof. Kenny, in Bulletin No. 44, has recently published a treatise on celery, in which, besides an historical sketch of celery culture and very full descriptions of varieties, he compares level and trench culture and discusses the "new culture" in which celery plants are set from eight to twelve inches apart each way in beds, concluding that if skilfully managed very large yields are secured, but when the beds are neglected, proportionately large losses are sustained The mulching of celery as a preventive against rust, first tried in the Rhode Island Experiment Station garden, is now applied successfully in the great celery fields of the state. It fits the "new culture."

Prof. Kinney's tests of the Loganberry are summarized by him as follows.

1. The Loganberry is the most promising new type of small fruit that has been grown at this station.

2. It has been called a red blackberry with a slight but distinct raspberry flavor.

3. It is supposed to be a hybrid between a variety of the European raspberry and a variety of the wild blackberry of the Pacific Coast.

4. Loganberry canes will probably not endure the New England winters without artificial protection.

5. The seed from which the original Loganberry bush grew was planted by Judge J. H. Logan, in Santa Cruz, Cal., in 1881.

6. The approved method of propagating the Loganberry is by stolons, yet the plants may be grown from hard wood cuttings.

7. Loganberry seeds germinate readily but the seeds are comparatively worthless when grown for fruit.

As a result of testing sixty kinds of American and foreign lettuce, a classification with illustrated descriptions of the varieties, is given in the Tenth Annual Report. Among the most promising varieties for culture in the private garden are the California Cream Butter, the Philadelphia Butter Head, Black seeded Tennis Ball, Early Curled Silesian or Simpson, Black Seeded Simpson and Prize Head. For cultivation under glass the Boston Market and the Golden Queen are highly recommended. The Paris White Cos receives commendation.

The asparagus rust which last year made such havoc in certain parts of Massachusetts and Rhode Island, appears from limited observation to injure the Palmetto variety least. Spraying with the Bordeaux mixture is being tried in Rhode Island. In one locality in Massachusetts an attempt has been made to destroy the germs of the disease by shallow plowing of the beds after the stalks have been cut and burned in the fall.

WASHINGTON EXPERIMENT STATION: PLANT GROWTH AND MOISTURE

Prepared by Prof. A. J. Spillman.

Through every growing plant a stream of water is constantly flowing. This stream begins at the roots and proceeds upward to the leaves, being lost by evaporation from the surface of the leaves. The life of the plant depends upon this stream. It brings the plant its food, and the amount of food the plant can obtain depends, among other things, on the amount of water that must flow up through a plant and out at its leaves for each pound of growth produced in the plant. The figures below show the water thus required to make a given growth of dry matter, that is, of plant material free from water. It has been found that to produce one ton of dry matter (equivalent to one and one-sixths tons of ordinary hay) there must pass up through the plant into the air 223 to 912 tons of water.

The dryer the atmosphere, and the more wind there is, the higher these figures, other things being equal. Assuming, then, that in this country the amount is 500, which is not far from correct, this means that to produce one ton of hay on one acre requires 430 tons of water, equivalent to 3.8 inches of rainfall, or irrigation water enough to cover the ground 3.7 inches deep. And this takes no account of water lost by percolation into the soil and by evaporation from the soil surface.

Professor King, of the Wisconsin station, found that in sixty-four days a well tilled summer fallow lost by evaporation water equivalent to 8.24 inches in rainfall, or .67 pound of water per day from each square foot of surface. "If we take the average daily loss from the soil at only .25 pound per square foot, from May 1st to September 1st," says he, "this would be equivalent to 5.27 inches of rain. I am sure it will do no one harm to know how much water a crop really needs; this knowledge ought to be specially valuable to men who pay for water by the inch."

If we could entirely prevent evaporation of water except from the plant itself, we could, on an average, produce five tons of hay with nineteen inches of water—enough water to cover the ground nineteen inches deep. The amount of water used in irrigated countries is usually about fifty inches. We thus see that crops use little more than one-third of the water applied to them under irrigation. Where rain must be depended upon, the proportion is much smaller, for rainfall does not come to order, but much of it comes at a time when it cannot be utilized before it has had time to get away into the soil and air.

Experiments have demonstrated that crops make the largest growth when the amount of moisture in the soil is between 40 and 60 per cent of the total amount it can hold, some crops, of course, requiring more than others.

The effort of the farmer should therefore be to maintain this amount of moisture in the soil. The simplest case to deal with, as far as methods are concerned, is that of too much water. Excessive moisture is injurious in two ways: It excludes the air, which is as necessary to the roots of plants as it is to other forms of life; and the constant evaporation of water from the surface keeps the soil cold. This cooling effect may amount to as much as 12 to 15 degrees; and we all know what a marked contrast exists between soils where the average temperature differs only two or three degrees.

I have not time here to discuss different methods of drainage, but will refer to them briefly. At one time in English agriculture, a system of cultivation known as the "ridge" system, was very commonly practised. It consisted in plowing the fields in narrow lands, throwing the ridges in the same place each year. Instances are recorded of ridges built up in this way until horsemen riding in adjacent furrows were hidden from each other. On wet lands this resulted in strips of productive soil on the ridges, with bare strips along the furrows. As is apt to be the case with any system that has some merit in it, and with many even that have no merit, this system became a fad, and was used on soils that did not need it. This plan, however, has its value on some lowlands. The ditch system of drainage succeeded this, and was, in most cases, an improvement. But in all cases where the value of the reclaimed land will warrant it, the tile system of drainage is the most effective, though very expensive. The cost of tile drains properly laid is usually about $30 per acre.

But the great problem before the farmer under ordinary circumstances is how to prevent waste of moisture. Moisture may be lost in four ways.

We have just spoken of loss from running off before having an opportunity to soak into the soil, and pointed out the only remedy we can apply,

It may also be lost by percolating into the deeper layers of soil. We can do little to prevent this. In loose, sandy soils, however, the addition of well-rotted manure gives the soil the power of retaining more moisture and thus prevents percolation to some extent.

A third and serious cause of loss is from weeds. It should be remembered that every pound of dry matter produced in the growth of weeds costs you 500 pounds of water. A ton of weeds on an acre means the loss of from 200 to 500 tons of water. I cannot here go into details as to the best methods of eradicating the various classes of weeds. There is one principle, however, which underlies them all. This consists, as Dr. Johnson, whose fame rested principally upon his use of big words, would have said, in severing the connnection between the growing weed and the matrix in which its roots are established.

The most important of all the causes of loss, however, lies in evaporation from the surface soil; important both on account of the large losses due to it and on account of the control we may exercise over it.

We have already seen that this loss may amount to a rainfall of six inches at a low estimate, while the loss under conditions that favor it may amount to probably twenty inches. By properly controlling evaporation we may save from a third to a half of the water added to the soil by rain or by irrigation. In the one case we can thus double the crop; in the other, save half the expense for water.

The loss of water by evaporation may be influenced in many ways, some of which we can control, and some we cannot. To understand what effect tillage may have, we must understand that water is brought to the surface by the force of capillary attraction. When moisture exists in a soil of uniform texture there is a strong force that tends to make the water scatter out uniformly in that soil. If moisture be lost from the surface other moisture comes up to its place. Soil may be thus dried out to a depth of four feet or more, if permitted to. This force acts much more strongly in a well compacted, fine grained soil than in a loose one; also, in moist soil better than in dry one. Rain may cause loss of more water than the rain amounts to. Now we want water brought up from below as much as possible for the use of growing crops, and as near the surface as may be, but, we do not want it to reach the surface. Hence, we want the surface (two to four inches) to be of such nature, or in such condition, as to prevent the escape of water through it, while all below this should be compact enough to cause capillary force to act with great power, while at the same time the soil must be porous enough to permit ready entrance to air so necessary to plants to thread their way through it readily. We have now the principles before us. We know what conditions we want in the soil, and why they are necessary. The methods we shall use to bring about these conditions must depend on the kind of soil we are dealing with, and on the season and crop. It is customary to speak of the loose surface portion which is to prevent evaporation as the mulch. This mulch may consist of finely broken soil, or it may consist of litter of any kind. In the case of pastures, meadows, and fall-sown grain, the mulch consists of the mat of green vegetation itself, which, when fully covering the ground, permits little evaporation except through its own leaves, and this is what we want.

The loss of water by evaporation from bare, well compacted grounds in early spring is simply enormous. An experiment by Professor King showed that the upper four feet of such ground lost in one week over nine pounds of water from each square foot of surface. Here was water enough to make half a ton of hay per acre lost by delaying plowing only seven days after it was in condition to plow. Not only that, but the land plowed as soon as it could be was loose and mellow, and easily worked, while that plowed a week later was rough and cloddy, and required four times as much work to get it in half as good condition for planting as that plowed earlier.

The object of plowing may then be summed up as follows: To incorporate plant food into the soil; to loosen up the surface to enable it more rapidly to absorb moisture; to give it necessary ventilation and to pulverize the surface, and thus aid in preventing capillary action from bringing all the moisture to the very surface.

To sum up: it should be our aim in handling soil to maintain a proper moisture content, to have a seed bed firm enough to cause capillary forces to keep it well supplied with moisture from below, and to prevent such free circulation of air as to dry out the soil, and yet porous enough to admit enough air to permit the growth of roots; and, finally, to keep the surface at all times covered, either by a mulch of vegetation, or, lacking that, to keep the surface three or four inches thoroughly pulverized and loosened up that no water can come through it from below.

I cannot close this paper without paying my respects to those great benefactors of agriculture, the weeds. Had it not been for them man might still be in savagery. But in his eternal battle against them, man has fortunately adopted the very methods that we now know to be the most effective in conserving soil moisture, namely, continuously stirring the sufrace into a mulch. True, we now stir the surface more intelligently than we used to, because we know what we stir it for; but it was the necessity for fighting weeds that taught us the lesson.

INDEX.

PAGE
Abortion 398
Agricultural College, Guelph 3
Agricultural Education 3, 5, 12
Agriculture, improved 96, 99
Agriculture in Public Schools 4, 11
Alcoholic Ferments in Nature 363
Alfalfa 67, 93, 374
American Experiments 366
Anderson, D. C 177
Animal diseases 427
Apples, Cultivation from seed to fruit 238
" Effect of grass on young trees 263
" Spraying an orchard 230
Asparagus rust 434

Bacon (see Swine) 180, 183
Bacteriology 4, 400
Barber, V.C. (Nebraska) 424
Barley 21, 25, 393
Barnyard manure 81, 380
Baty, Thomas 104
Beans for ensilage 71
Beef Cattle 137, 390
Bees, swarming and travelling 387
" effect of spraying on 253
Beet Sugar 376, 408
Birds in relation to agriculture 317
Blackberries 241
Blackbirds 326
Black knot 242, 387
Bleeding, an immunity from disease 365
Blight on potatoes 70
Bluebirds 333
Bluejays 325
Bobolink 328
Bokhara clover 67
Botany in Public Schools 15
Bran 405, 416
Bray, Jacob 76
Bread-making 283
Bingham, A. A. (Rhode Island) 431
Brodie, G. A 12
Brodie, Dr. William 66
Brown, Alfred 69
Buckwheat 377
Burrell, Martin 310
Business methods in Farming 107
Butter (see also Cow, Dairy and Milk) ....
" British market 206
" effect of period of lactation 367
Butter-making, home 211, 214
" creaming 194
" new methods 358
" utensils and appliances 195, 370
By-Laws of Women's Institute .... xx.

Cabbage for green food 52

PAGE
Calves, feeding of 132, 135, 141, 389
Canal tolls 98
Canning factories 65
Carpenter, Mrs. F. M 281
Carrots 80
Caston, G. C 60
Cat Birds 334
Cattle, Breeding and feeding 137, 138, 140
" Concentrated feed for 420
Celery 433
Cheese (see also Cows, Dairy and Milk) ....
" effect of fat in milk 194, 360
" exports 207
" curing 222, 372
" management of factories 210
Chickadee 332
Chickens, feeding experiments 394
Chicory 67
Christner, C. N 165
Clarkson, John 50
Clover (Alfalfa, Bokhara, Crimson, etc.) 67
" raising for profit 95
" constituents of 416
Coarse feed 389
Codling moth 387, 428
Cohoe, Justus 229
Cold storage 100
Comfrey 67
Concrete floors 101
Conn, Joseph 58
Connecticut, agricultural experiments 399
Constitution of Women's Institute .... xx.
Corn, cultivation of soil 63, 79
" Economical food for cows 220, 227
" experiments 410
" fodder *vs.* silage 423
" growing for silo 71, 75. 76
" loss of fodder by exposure 373
" Manure for 373
" Planting 373, 416, 424
" Seed 372
" Smut 385
" Stover, feeding value 394
" Varieties 419
" Yields 373, 409, 425

Corncobs of value as food 121
Cow (see also Dairy and Milk) ....
" cost of feeding 203, 214
" Dairy, Type of 221, 224, 229
" Feeding and care of 131, 219, 400, 415, 422
" Good *vs.* Poor 366
" Management of 99, 131, 400
" Soiling for 421
" Stables for 206, 210, 225
" Yield of milk 407, 423
Cow Birds 327

PAGE
Craig, John A 152
Cream, experiments with pure cultures 358
Crimson clover 375
Cross breeding of Plants (cereals) 31
Cross-pollination 382
Crows 323
Cuckoos 335
Cultivation 60, 63, 79
Curculio 242
Currants 241
Cut-worms in onion fields 388

Dairying: (See Butter, Cheese, Cows, Milk).
  Barns 417
  Buttermaking 195, 211, 214, 367, 371
  Canada in the British market 207
  Care of Milk 218
  Dairy School, O.A.C 3, 194
  Education 190, 192
  Effects on Soil Fertility 215, 424
  Experiments, American, European 358, 366
  Pasteurizing milk and cream 202, 417
  Profitable 203
Dakota, North 402
Davenport, E. (Illinois) 407
Day, G. E 52
Dean, H. H. 190, 194, 222
Dearness, John 35
Dixon, W. L 243
Drainage water 380
Drainage 108, 435
Dryden, Pioneering in 115
Ducks, Pekin 256

Economic Plants 66
Economy, Household 266, 281
Eggs 245 258
Elford, A. E 93
Enlarging the Farm 47
Ensilage, growing corn, etc., for 71, 416
" value as feed 220, 227, 423
Entomology 310, 387
Essex, Robert H 245
European Experiments 358
Evaporation 435
Evergreens, transplanting 234
Ewing, J. B 164
Experiments, American 366
" European 358

Fairweather, Wm 84
Farm, a Source of Income 39
Farmers' Gardens 240
Farmers' Institutes, Financial reports xiv
" Officers for 1898-9 x
Farmers' Wives 261-279
Farm Life 293
Feeding cattle 131-140
Feeds and feeding 391, 411, 420
Fencing 103
Ferguson, J. J 211
Fertility (see soil fertility) 49, 50, 215

PAGE
Fertilizers, experiments 31, 378, 401, 418, 429
Ficht, Valentine 162
Field crops 260, 372
Field roots 79
Financial Reports of Institutes xiv
Finches 337
Fish culture 305
Fixter, John 71
Flax culture 375
Flowers, Cultivation in open air 303
Fly catchers 336
Foal and mare 126
Food investigation 399
Forage for pasture 426
Forest trees 90
Freight rates 98, 100
Fruits, comparative value of 409
" new market for 235
Fungi 35
Galbraith, Alex 123
Garden of farmer 240
Garget 396
Geese 257, 395
Germany a market for fruit 236
Gibb, Wm 148
Gilbert, A. G 247
Glendinning, Henry 86
Good Roads 349, 378
Gooseberries 241
Gould, Joseph E 60, 74, 75
Grackle 325
Graham, W. R. 249
Grain crops, cultivation 63
Grant, W. M 103
Grapes 241
Gypsum 56
Haecker, A. L. (Nebraska) 424
Hallman, A. C 135, 180
Hanmer, D. G 161
Harris, W. C 305
Hatch Experiment Station 417
Hawks 317
Hay 405
Hayward, G. F 251
Hemp 67
Henderson, Thos. S 183
Henry, W. A. (Wisconsin) 121
Hilborn, W. W 233
Hill, Chief Josiah 256
Hobson, John I 264
Hogs (see Swine).
Hollingworth, Alice 15, 117
Holtermann, R. F 233, 315
Home and Household 261
Home, How to make attractive 298, 299
" Selection of 293
Honey, R 176
Hoodless, Mrs. Adelaide xxii, 261
Horses 123-130, 363, 402
Horticulture 4, 230, 380

PAGE
Housekeeping, economic 270-278
Houston, Wm 11
Humus in the soil 53, 57
Hybridization 31

Ideal farmer 300
Illinois experiments 407
Incubators 248
Indian department 356
Insecticides 231, 388
Insectivorous Birds, Act 341
Insect Life 310, 313
Insect pests 409

James, C. C 4
Jones, Mrs. E. M 131
Judging Sheep 152

Kaiser, J. M 300
Kansas department 409
Kentucky blue grass 68
Ketchen, A. P 173

Labor, statute 355
Lambs 154, 161, 164, 390
Lawrence, D 298
Le Boutellier, John 163
Leguminous crops 421
Lettuce 433
Lightning rods 104
Lime as a fertilizer 378, 431
Lindsay, J. B. (Hatch Station, Mass) 417
Linton, Wm 141
Live Stock 121
Lochhead, Wm 313
Loganberry 433
Louis, Theodore (Wisconsin) 166
Lucerne 67, 93, 374

McAinch, John M 242
McCallum, T. D 52
McCallum, W. A 293
McCrae, David 142
McGregor, W. C 137
McLaren, A. F 207
McMillan, John 171
McMillan, Thomas 63
McNeill, A 101

Macfie, C. M 215
Macoun, W. F 31
Macpherson, D. M 75
Maine experiments 410
Mangels 80
Manure 81
Mare and foal 126
Mason, T. H 83
Meadowlark 328
Meat making 138
Meetings of Institutes ix, xviii
Melilotus 68, 419
Meyer, J. E 236, 258
Michigan experiments : 415

PAGE
Milk (see also Dairy).
" care of 218
" cleaning 358
" composition 393
" economical production 224
" fat 194, 360
" frozen 358
" germs 368
" influence of silage odors 37
" pasteurization 202, 417
" profits 229, 423
" sterilization 202
" yields 407, 423
Milk fever 396
Milking twice and four times daily 359
Miller, Bella 192
Millet 375, 389
Moisture in the silo 54, 58, 435
Molasses for dairy cows 359
Mosquitoes 389
Mule feeding 403
Muskoka farming 117

Nash, Charles W 317
Nash, Maggie E 278
Nebraska experiments 424
Neilson, M. M 355
Nichol, John C 168
Night Hawk 339
Nitrogen as a fertilizer 432
Nitrogenous salts 361
Nuthatches 332

Oats 27, 405
O'Brien, W. E 99
Officers of Institutes x.
Ohio experiments 429
Orchard 230, 236, 363
Orchard grass 68
O'Reilly, James 236
Oriole 329
Ornamental trees 233
Ornithology 317
Orr, J. Edwin 230
Orr, James E 303
Owls 320

Palmer, L. C 110
Palmer, W. J 202
Parasitic fungi 35
Pasteurizing milk 202, 370
Peach buds 383
Peaches in Britain 235
Peart, A. W 108
Peas 21, 23, 25, 67, 376
Pettit, Evelyn S 290
Phelps, Charles E 399
Phelps, Walter 253
Plant food 52
Plant lice 386
Plowing 425

PAGE
Plums ... 242
Pork (see Swine) ... 177
Potatoes ... 69, 80
Poultry ... 4, 245-260, 395

Rape ... 392
Raspberries ... 241
Rathbun, E. W ... 96
Raven ... 325
Raynor, T. G ... 170
Reed, J. H ... 126
Rennie, Simpson ... 79
Rennie, Wm ... 49
Reynolds, A. J ... 292
Rhubarb ... 241
Richardson, J. W ... 240
Richardson, M ... 81
Riggs, C. H ... 308
Roberts, I. P. (Cornell) ... 39
Robertson, John ... 221
Robin ... 333
Robson, W. M ... 238
Rogers, T. C ... 195
Rogers, Mrs. R ... 276, 279
Rose, Laura ... 262, 270, 283
Rotations ... 55, 69

Saltfleet Women's Institute ... xviii.
Sanitation in rural districts ... 285
Scott, J. H ... 218
Scott, Thomas ... 214
Scott, W. W ... 95
Seed selection ... 17, 377, 398, 433
Sheep ... 152-166, 364, 391, 414
Sheppard, James ... 353
Shepperd, J. H. (N. Dakota) ... 402
Silage ... 75, 220, 227, 392
Silo ... 71-78, 416
Smith, C. D. (Michigan) ... 415
Smith, Chief A. S ... 356
Smith, Mrs. J. L ... 266, 272
Smith, Wm ... 128
Smut ... 38, 385
Smyth, W. G ... 295
Snyder, J. R ... 110
Social life on the farm ... 264, 295
Soil cultivation ... 60, 408
Soil fertility—
  Effect of dairying on ... 215, 425
  Loss in drainage water ... 380
  Restore and maintain ... 49, 429
Soiling ... 421
Soil moisture ... 58
Sowing and reaping ... 302
Sparrow ... 337
Spillman, A. J. (Washington) ... 434
Spraying an apple orchard ... 230
Spraying, effect on bees ... 233
Stauffer, L ... 107
Stevenson, R. S ... 219

PAGE
Stonehouse, James ... 203
Storrs Experiment Station ... 399
Stover ... 394
Strawberries ... 240, 243
Sub-soiling ... 425
Summer fallow ... 56
Sunflowers ... 71, 74, 75
Surface cultivation ... 60
Swains, W. R ... 127
Swallow ... 338
Swine ... 166-189, 393, 415

Taylor, J. F ... 65
Thompson, Phillips ... 88
Thompson, Robert ... 185
Thorne, Charles E. (Ohio) ... 429
Thrushes ... 332
Timothy ... 27
Tobacco culture ... 110
Tolton, James ... 299
Tomatoes ... 384
Transportation ... 98
Tree creeper ... 332
Tree planting ... 88, 234
Trees, ornamental ... 233
Trew, D. C ... 254
Trout culture ... 305, 308
Tuberculosis ... 143, 395, 412
Turkeys ... 258
Turnips ... 80, 362, 377

Underdraining ... 54, 108

Vegetables ... 241
Ventilation of the home ... 289
Vetch ... 67
Veterinary experiments ... 363, 395
Viscogen ... 371
Voorhees, E. B. (New Jersey) ... 422

Wagar, Charles D ... 129
Warbler ... 335
Washington (Ter.) experiments ... 434
Weeds ... 84, 86, 410, 435
Wheat ... 19, 62, 406
Will, Thos. E. (Kansas) ... 409
Windbreaks ... 93, 234
Wilson, A. C ... 57
Women's Institutes ... xviii., 261, 263
Woodpecker ... 329
Woods, Charles D. (Maine) ... 410
Woodward, J. G ... 138, 224
Woolverton, Linus ... 235
Wren ... 335

Yeomans, G. M ... 115
Young, C. W ... 250

Zavitz, C. A ... 17
Zavitz, Edgar M ... 302

TENTH ANNUAL REPORTS

OF THE

INSPECTORS OF FACTORIES

FOR THE

PROVINCE OF ONTARIO,

1897.

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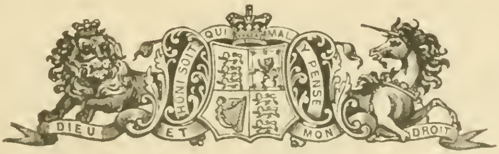
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1898.

TENTH ANNUAL REPORTS

OF THE

INSPECTORS OF FACTORIES.

WESTERN DISTRICT.

To the Honorable the Minister of Agriculture :

SIR,—The depressed state of trade which has prevailed for several years still continued, so far, at least, as manufacturing was concerned, through the early portion of the year, up to the time when the harvest was ended ; then it was found that crops, especially that of wheat, were abundant, and a very sharp advance in the price of wheat gave a feeling of greater confidence among business men, which had the effect of creating a livelier demand for goods, including of course those of domestic manufacture. So much so was this the case, that applications for permits to work overtime in factories employing females—where only the permits are necessary—this year up to October 18 (date last permit was granted) were twice as many as were granted for the whole of last year. Several of the proprietors asked to have the permit extended beyond the 36 nights till 9 o'clock fixed by law, but of course I could not accede to their request. The very limited time allowed by law for overtime employment forced some employers to do their overtime work with males, and some worked night and day with a double staff, which is not contrary to the Factories Act, so long as the week s work of 60 hours for females is not exceeded.

This year I have visited the factories in the greater part of my district. I have not had any unpleasant experiences among the employers, though at times I have duties to perform, or alterations to suggest, that are not looked on with favour by the proprietors of factories. Still I am pleased to be able to report that nearly all of my suggestions as to changes to be made under the Act have been cheerfully carried out.

CHILDREN.

I have not found any children under 14 years of age employed in any factory I have visited this year, except in fruit and vegetable canning and desiccating factories, where they are permitted to work at certain processes.

VENTILATION.

This is a prolific source of complaint, especially when it includes the removal of dust, gases, etc., generated in process, and this year I have had a few complaints of the dust in foundries and other places where emery and polishing wheels are in use. These I have enquired into, and found in some cases to be as represented, and suggested remedies, which have mostly been adopted promptly, and in one or two instances, rather tardily. Some of those places complained of have had for some time fans for the removal of dust generated in process, but for some reason or other these were not working satisfactorily. Some were not of sufficient capacity. Some were not run fast enough, and others not well applied, connections not tight, and in one case the fan, large and powerful, was discharging large quantities of dust into a house, built for the purpose, near the door of the workroom. This receiving house was not wind tight, and the escape flue from its roof did not much relieve the pressure inside, and a considerable portion of the dust was forced out through cracks and open joints, and this escaping dust was at once arrested, so to speak, by the great in-current made by the fan in the work room, and carried back into the room. Thus the fan was doing little good—a clear waste of power. Very often a system of fan and pipes, good at first, gradually gets bad by neglect, till it becomes useless for the purpose intended, just because it is not looked after. The fan driving belt becomes slack or lumpy from dirt accumulating on the running side, and in both these cases the belt slips, and the fan has not proper speed to do its work. Then again, the pipes are not tight, nor the boxes in which certain machines run, and the fan feeds itself from these leaks, and ceases in part to do its duty. A fan running in a room and discharging outside is doing some good by bringing in fresh air, though it may not be carrying off the dust as was intended.

In two bicycle factories in this city I had fans put in to take away the dust from emery and polishing wheels, and when I next visited the places the fans were not in operation. I asked the reason of the workmen, and in one case the reply was there was no need for it, and in the other the running of the fan jarred the floor so as to interfere with the proper working of the wheels. In foundries it is impossible to get rid of all the dust. It is a dust-producing business from first to last. In some foundries the hand scratching is done in the same room where the mills or rattlers are running, causing considerable dust of itself. Again the sand from the castings in rattlers is screened in the same room and adds very much to the quantity of dust flying in the air. I recently visited a foundry where these two processes were being done in the same room with the rattlers, of which there were several boxed in and connected with a powerful exhaust fan; there were large quanties of dust pervading the room from the hand-scratchers and screening, which could not be removed by the fan connected with the boxed-in-rattlers. The quantity was greatly reduced when one of the rattlers was idle and the lid of its surrounding box was open. The fan drew freely from the dusty air of the room.

I have had several complaints about smokes and gases in the blacksmith shop of one of the railway companies. I drew the attention of the company to the matter, and considerable changes were made in the way of ventilators, which could be opened or closed at will, to suit the direction of the wind. A large ventilating pipe or stack twenty feet long on the roof ran to a pipe from over the spring fire, as most of the gas appeared to come from this fire. Complaints still continued to be made. The company then placed two ventilating stacks (of wood) in the shops. They are sixteen feet above the roof and six feet square at the bottom and three at the top. After this was done complaints were stopped for a time, and it was thought the evil was remedied. They are now considering some other steps, amongst them a fan with a hood over each fire. The company seems anxious to remove all causes for complaint. It is useless to depend on natural ventilation in such works, for the varying condition of the air makes a material difference whether the smoke and gases will rise to the ventilators, sometimes high over head. When the air is dry and heavy they will rise, but not so when it is full of moisture and consequently light; or, in other words, when the column of mercury in the barometer is fairly high, they will rise, and *vice versa*. This is something the workman cannot control, and some system more reliable and constant is wanted. The Buffalo Forge Co., who manufacture nearly every variety of system for heating and ventilating, to whom I referred the railway company to consult, wrote me to say that the evil could be remedied if they would spend some money on it, which I think they are inclined to do, for the company looks after its own interests by looking after the welfare of its employees. Recently in walking up a way station yard after dark with the conductor of the train I had left for the purpose of taking a faster one soon to come along, he remarked to me:

"Just think of it; fourteen years running and not a passenger killed." The conductor was as proud of that as if he had been a director or manager, and this is an example of a proper feeling that exists on the road and in the shops. But this feeling does not prevent complaints of any evils that exist.

The disposal of dust discharged by exhaust fans is a difficult problem to solve. In cities the by-laws forbid discharging it in the air as a nuisance to the neighborhood, and if one discharges it in a receiving house there is apt to be a back pressure, which interferes with the efficiency of the fan. Some have tried discharging it into water, but the force of the wind blew the water out of the receptacle. For the most part large fans discharge into a receiving house furnished with a tall flue to allow of the wind to escape and thus relieve the back pressure. Some of the finer dust thus escapes this way. There is one foundry in my district where the fan discharges into a large hopper overhead, and whenever the hopper is full of dust it is emptied through a chute into bags and thrown on the dump. I have been told that in Glasgow, Scotland, these fans discharge into sewers. I do not know if this is the case, but I would be inclined to think the wind pressure would cause the sewer air to force the traps and enter houses, especially in a locality where there were several factories using powerful fans which discharged into the sewer. This again would necessitate the sewers being cleaned by the removal of accumulated dust. It would be a satisfactory way of disposal of dust, provided it was not followed by other evils worse than the one removed.

In factories where electric lighting has been introduced, the condition of the air has been improved, or it has not been vitiated to the same extent as by gas burners, nor does the temperature rise to any appreciable extent. Electric lighting is safer, too, as regards fires, and there is no occasion to use matches, which often are thrown aside carelessly. In New York State, about a year ago, in a shirt and collar factory on the fifth story, the floor was littered with cotton cuttings of the day's work.. At dark on lighting the gas the party threw the lighted match carelessly on the floor, and in an instant the cotton caught fire and rapidly spread, causing a panic among the girls, some of whom jumped from the windows. Of course this need not have happened if the match had been extinguished before throwing it away; but such caution is not to be looked for in the majority of people. So it is best to avoid the necessity for it, as far as possible. The incandescent electric light is more convenient in many operations, as it hangs from a flexible insulated wire, and can be moved to examine the work in process on the machine. It is safer in industries where there is a liability to explosion from gases, vapors and very fine dust. Electricity is used as a motive power now to quite an extent, it is applied personally direct or to a small countershaft. In clothing factories, both for women and men's wear, formerly the sewing machines were operated by foot power, they now have introduced electricity, to the benefit of the health of the workers, who are mostly females, except in the manufacturing of cloaks. They simply press on the treadle and the operator has only to guide the work. They can turn out more work and not be as exhausted as when they had to provide the power for operating the machine. This innovation has come to the workers without any charge or deductions from their earnings, except in the glove trade, where I believe it is the rule to tax the workers a certain sum weekly as an offset to the advantage granted, on the principle that luxuries must be taxed. But what is considered a luxury now will in a short time come to be a necessity, and then the tax will disappear.

The conditions of labor, for female workers especially, have been vastly improved in the last quarter of a century. In my early recollections they worked twelve hours a day, except on Saturday, one hour less. There was no thought, as a rule, to the safety of the machinery, other than in mill gearing. In winter the buildings were cold, partially and unevenly heated by stoves burning wood. There was but little attention paid to ventilation, which was badly needed in the winter months when the days were short and the rooms were lighted with smoking lamps burning fish oil. Wages were not nearly so high as at the present, but on the other hand, the cost of living was much less, and the requirements of dress were simple. Now the longest hours worked in any factory are sixty a week for females, and different industries work various weekly hours down to forty-four. The textile workers have to put in sixty hours a week, except with very few exceptions fifty-seven hours. Work rooms are better constructed, better ventilated, heated and lighted. Machinery is fenced or guarded, all sanitary conditions of labor are better, and factory life is much more pleasant than formerly. I have in mind as a boy the agitation for making eleven hours a day's work in the textile trades. That was won by the workers without much opposition. Then it was tried to have them reduced to sixty hours a week; the workers were successful in this move also. Still there was no scarcity of manufactured goods from the lessened number of hours worked.

A great many of the factories outside of cities are good buildings, heated with steam and lighted by electricity.

BAKE SHOPS.

So far as I have visited bake shops this year, I found them kept more cleanly than was the case on my first inspection. The evils that prevailed in most basement shops—poor light and ventilation—still exist, and will continue to be so as long as they are in use.

I have not had many complaints under the Bake Shops Act, and those I had were chiefly of excessive hours and working on Sunday night. The Act was amended last Session prohibiting Sunday labor in bake shops. It has been the custom in cities for many bakers to have their men begin work on Sunday night at 9, 10 or 11 o'clock to get out fresh bread on Monday morning early. Most employing bakers readily accepted the amendment, but there were a few who died hard, to use a common expression, and continued on their old way till repeatedly warned.

The law is not enforced to the extent of the prevention of setting the sponge on Sunday night, which takes four or six hours to rise. The clause in the Act prohibiting Sunday labor only operates so far as bakers employees are concerned, and does not prevent the employing baker from setting the sponge on Sunday up to 12 o'clock p.m.

There was recently a prosecution under the Bake Shops Act. The charge was working the men longer hours than is allowed by law, without a permit from the Inspector The defendants were fined $20 and costs. This case has been appealed against, and is awaiting a hearing. The employing bakers are watching the result with considerable interest.

EXTENSION OF JURISDICTION.

"An Act respecting Shops and Places other than Factories" is the title of an Act passed a few years ago, and was left to the different municipalities on petition to see carried into effect, but it was found not to work satisfactorily, Very few municipalities enforced it, and during the last session of the Legislature it was greatly altered and given over to the Factories Inspectors to see that its provisions were carried out. Great good was effected in sanitation and in shortening the hours of labor of female employees. The Act has jurisdiction over shops of nearly all kinds and small factories, regulating hours of labor, age of children, sanitary matters, etc., so that small factories not employing more than five persons, and escaping from the jurisdiction of the Factories Act, will come under this Act.

ACCIDENTS.

In case of a fire or accident in any factory occasioning any bodily injury to any person employed therein, whereby he is prevented from working for more than six days next after the fire or accident, a notice shall be sent to the inspector in writing by the employer forthwith after the expiration of the said six days, and if such notice is not so sent, the employer shall be liable to a fine not exceeding $30.

In case of an explosion occurring in a factory, whether any person is injured thereby or not, the fact of such explosion having occurred shall be reported to the inspector in writing by the employer within twenty-four hours next after the explosion takes place. And if such notice is not so sent, the employer shall be liable to a fine not exceeding $30.

Where in a factory any person is killed from any cause, or is injured from any cause in a manner likely to prove fatal, written notice of the accident shall be sent to the inspector within twenty-four hours after the occurrence thereof, and if such notice is not so sent, the employer shall be liable to a fine not exceeding $30.

The above is the law relating to accidents. It is very essential that accidents be reported to the inspector, that he may examine the machine or place causing the injury with a view to guarding it, to prevent a repetition of such accidents. This is the object of having them reported, and not, as some suppose, for the purpose of beginning a trial for compensation for injuries. The inspector has nothing whatever to do with such actions at law, except, as any other citizen, to appear as a witness after a subpœna has been served on him. But I feel sure that this wrong impression has influenced some employers against reporting accidents. I feel that some small factories in outlying places do not report accidents, and I invariably ask, when visiting nearly all factories, if any accidents have happened during the year. By this I get to know of quite a number that had not been reported, and at the same time, if any, I can examine the parts of the machine, or place, where they occurred. In writing of accidents, I am reminded that in some factories I noticed a small outfit of articles likely to be serviceable as a first aid to the injured, such as lint, bandages, tourniquet, liniment, sticking plaster, etc. Some still adhere to the old system of outfit, viz , varnish and rag. In these days the enterprise of manufacturers has put on the market many useful articles for surgical appliance, and many factories have thus been able to keep on hand such as are likely to be useful in case of accident. In other factories classes have been organized to teach the employees what to do as a first aid to the injured. This knowledge cannot be too widely spread, especially in country places, where often there might be a great delay in procuring a doctor, and the injured person lose too much blood.

This year I had 91 accidents reported up to November 30th. This is an increase of one over the number reported last year to December 31. Of this number five were fatal, the first of which happened at the McDonell Rolling Mills, Toronto. It occurred in this manner: A bar of red hot iron coming through the rolls caught Samuel Huntley in the back of the leg behind the knee; eight or ten feet passed through the flesh of the leg, when he caught the hot iron in his hands, but at once became insensible, fell down and died in ten or fifteen minutes after. As soon as I heard of the accident I visited the mills, examined the rolls and floor, but I could not see that any precautions were omitted. The iron went through the proper place in the rolls and the floor that it slid on after coming through was smooth and did not present any unevenness which would tend to deflect the soft hot iron from its course. It would seem that the unfortunate man was standing in a line with the delivery, and possibly was not watching to see if it was being delivered right. Something depends on the temperature in such cases, for if the iron is very hot the end will soon fall, and if much cooler it will be stiffer and will carry further before it falls. I have seen bars 100 feet occasionally double up and turn over with a twist, and I am a little nervous when the rolls are in operation when I am visiting the mills. There is, in general, danger, and it behooves the workers to be very careful as the rolls deliver the iron pretty rapidly.

Another fatal accident happened at the London Furniture Company's factory, London, by which Fred. W. McLeod fell down the elevator shaft twenty-seven feet, and the report of the accident sent to me said he was not seriously hurt. Still he died a few days after. The factory was running at night work at the time and the light was said to be not good at the elevator, which was protected by a bar, and which is said to have been in place; if so, then McLeod must have gone over or under the guard.

The next fatality happened to two brothers, George and Percy Holden, young men at the Gutta Percha and Rubber Co's works, Toronto. It seems they were preparing to make a varnish of a kind peculiar to their industry. I understand one of the ingredients was benzine. If this was the case it will account for the explosion by which the men were so burned as to cause death to result a few days after. Benzine is critical material to manipulate with, and should only be handled by persons having a knowledge of its properties.

The last fatal accident happened to John Hay. He was struck in the abdomen by a piece of wood thrown from a rip saw. His injuries were not considered serious at first, but, as is often the case in injuries of this nature, inflammation (internal) set in, and in less than a week terminated fatally. This accident happened at the Canadian School and Office Furniture Co's works, Preston.

A list of particulars of non-fatal accidents will be found appended, from which it will be seen that eighteen persons had their fingers injured by other than cuts and that thirty-three persons received cuts in their fingers, some in one finger and others in four fingers, from serious cuts to the loss of one or more fingers. Two persons had an eye each injured; five persons had an arm each injured, one of them suffered from a broken arm; eight persons had a hand bruised or lacerated; one person, a female, had her hair caught on the shaft of a machine, pulling out about two square inches area; one person injured internally; three persons had a leg each hurt; one a head; one suffered from a broken jaw; one from burns caused by putting his foot accidentally in a mould filled with molten metal; and a few in various other ways. It is pleasing to note that no persons below sixteen years of age were injured, and that only five females received injuries, the most serious of which required the amputation of a finger at the second joint.

There were twenty accidents reported in the metal trades, thirty-five in the woodworking trades, five in the textile industries, one of which occurred in the calenders of a jute bag works, one occurred in a printing office, two in rubber works, and four in various other trades.

There were six accidents from elevators and elevator shafts. One man had a leg caught between platform and frame, one was caught between guard and platform; he was looking over when platform came down, resting its whole weight on his shoulders, causing him to fall over the guard into the well on to the platform, which had fallen the length of the unwound cable. He was seriously hurt but will recover. Of the remaining accidents from elevators, four were caused by falling down the shafts, two of them at night.

Only two accidents are reported from cleaning in motion, and one from being caught in overhead shafting. The person injured was a regular employee, but at the time was doing some brick work, stopping up a hole in the wall through which the shafting passed. He was standing on some lumber and the shafting was revolving. It is supposed some ravelled threads of his smock sleeve caught in the shaft and wound up his arm and carried him over two or three times and then he fell; his injuries are not serious, but it is a wonder he was not killed.

I am pleased to be able to record no great increase in the number of accidents compared with last year, and a decrease compared with years previous to last year, which by a change in the law made reportable a number of accidents not previously to be reported. This leads to the belief that preventible accidents are very many less, owing to the better protection of machinery and dangerous places as required by The Factories Act. Of course there will always be non-preventible accidents, that is those that occur through want of proper care on the part of the injured person or some of his mates. These it will be difficult for legislation to wholly prevent, and they form the greater part of those accidents reported.

There was an unusual number of accidents happening about elevators and wells or shafts. This class of accidents can in nearly all cases be prevented by fencing, but for the fact that some careless person leaves the opening with the guard removed. Often I have seen self-closing doors fastened open and left so. How many serious accidents occur through such criminal negligence every year in all parts of the empire! Dangerous parts of machinery and places which have guards are much more dangerous if the protection be removed, for those working near, accustomed to the protection, are not so watchful.

For the early part of the year accident reports came in slowly, and I began to think the number reported would fall considerably short of that of last year, but I found that quite a number came in during October and November, partly owing, I dare say, to the improved condition of the manufacturing trade. All those accidents are called unpreventible which are not classed as preventible, but I think that a third class might fairly be made from those classed as unpreventible. I refer to those happening from a monotonous occupation, as metal stamping, and some others. Where the very monotony of the work has a tendency to dull the mind, to partially hypnotise the worker, or puts the watchful faculties of the mind off guard; the mechanical movements of the arms go on, the fingers stay a moment too long under the dies (or in other dangers), till the unfortunate victim is roused by the pain of mutilated fingers. There are some workers, too, not in a fit condition to be around dangerous machinery or places for want of proper rest—young people who are out dancing three or four nights a week till late hours, having a couple of hours' sleep, and perhaps none. Then, again, those who are unfortunate in having sickness in their families, which requires attention through the night often by the worker, who cannot afford a trained nurse and who has to watch the patient through the night and go to his work in the morning, having had but little sleep, and it may be that his thoughts, instead of being on his work, are on the sick member of his family who is in a critical condition. There are some occupations where it would be a positive danger to work under such conditions, so I have long thought it was not fair to the worker in all cases to accuse him of carelessness when accidents happen. My attention was once drawn to a boy in a paper mill laying off paper at the cutters, he being asleep, but he continued to work. He ran the risk of putting his fingers in the knives. I think proper rest is an important factor as regards accidents in factories, and is one that railways recognize, for when an engineer, fireman, conductor or brakesman reports that he is overworked and needs rest, he can, as a rule, get it. Some serious railway accidents in America during the "World's Fair" were attributed to overworked employees, as the travel at one time was so heavy.

Then there is a class of accidents which cannot be foreseen or guarded against, such as a running belt breaking or becoming unlaced, and getting entangled in the machine, and throwing out some of its parts, striking some person probably. The breaking of a rope or cable, of an iron shaft, of a pulley, and many others, occasionally happens, often injuring one or more persons. Care and a periodical examination of these parts, and other parts, will in a great measure prevent accidents of this nature, but it is impossible to wholly avoid them.

While inspection has done much to lessen the accident list in this Province, I do not look for the total number ever to fall below that of this year and the previous one. In Britain, the Factory and Workshops Act has been in existence for nearly a century, at first in a crude shape, but greatly improved as experience showed the way; with a large and efficient staff, from the chief inspector down to junior inspectors, and with the best law of the kind in any country, rigidly enforced as to its provisions, especially as regards protection from dangerous places, and parts of machines; yet the yearly number of accidents reported is between 9,000 and 10,000. Most of these are of the class called unpreventible, including cleaning machinery in motion. I must explain that in Britain it is a reportable accident if the injured person is idle forty-eight hours as a result. Here six days is the limit. If the Ontario law limit were two days instead of six, the accident list would be much larger—probably three times greater.

I refer to the British law because some critically disposed people now think that as "The Ontario Factories' Act" has been in force over ten years (since July 1st, 1887), there should be no more accidents. I maintain that the number is about as low as may be expected with the present number of employees. Of course one needs to consider that trade has been in a very depressed state for several years, and that of itself has the tendency to reduce the number of accidents, both because there are less employees at work, and there is an absence of hurry and the employees are more deliberate in their movements and less liable to meet with mishaps. Also when work is scarce it is necessary to reduce the staff of workers, and the employers will, as a rule, let those go who are least desirable, and no doubt their liability to meet with accidents either from heedlessness or misfortune will be taken into consideration, and thus by selection reducing the possibility of accidents to a minimum.

Boiler Explosions.

There have been no explosions of boilers reported in the western district this year. This is an exception. The only explosion of another nature was that of varnish, at the Rubber Works.

Last year there were reported fourteen deaths from accidents of all kinds, six of them from explosions by boilers, against five fatalities from all causes this year. So, if the employee is not getting steady work, nor very high wages, he, at least, seems to be safer in his employment, which is a consideration not to be lightly despised.

I have the honor to be

Your obedient servant,

ROBERT BARBER,
Inspector

CENTRAL DISTRICT.

To The Honorable the Minister of Agriculture:

Sir,—I have the honor to submit the following report on Factories Inspection for the Central District of Ontario, for the year 1897:

Age of Children.

Having in former reports suggested the necessity of children obtaining certificates of age from their teachers on leaving school and before being allowed to work in factories, I need not further refer to the matter.

Hours of Labor.

Complaint was received in April that the Rolston Laundry Company was working its female help more than sixty hours a week. A warning having had no effect, the proprietor was fined $2 and costs in each of three cases. Laundry work varies greatly from week to week, according to the weather. The hotter the weather the more is laundry work required; but unfortunately for the workers they are least able to work long hours during the hot season, and as a consequence girls frequently faint at their work during such weather. As the city laundries have agencies established in the towns and villages throughout the country, much outside work is obtained at times, causing the females to be overworked, and a difficulty exists in obtaining experienced help when wanted. In the case above referred to, twelve additional females were employed, and no complaints have since been received.

Difficulty is often experienced in obtaining evidence in cases where complaints have been made; the only thing to be done in such cases is to summon all the employees.

Complaints are sometimes made that the working hours for females are still too many, and the hope is expressed that legislation will be enacted to still further restrict the hours of work. If those who wish to see the hours of labor reduced, or the condition of the workers improved, would only patronize products of factories and employers whose workers are treated with consideration, there would be little need of legislation. But unfortunately the desire for cheapness of products overcomes every consideration, the considerate employer is ignored and the inconsiderate one is aided in continuing the evils to which many workers are subjected. The wives and mothers of the land are most to blame, in that they principally exercise the patronage which can remedy the evils.

Dust.

Where dust is generated to an injurious extent in some of the older established factories, there is an unwillingness to provide means for its removal although they may be quite able to do so, notwithstanding that the danger to the health of the workers is acknowledged. Particularly is this the case in a factory in Smith's Falls.

In some of the smaller industries complaint is sometimes made that, while the proprietors are willing and anxious to comply with the law, the cost of erecting a fan and piping to remove the dust is not the only expense, but where they have no power to spare and a larger motive power would be required, they are unable to meet the additional expense.

In cases where emery or buffing wheels are in operation a simple method of removing the dust has been suggested by Assistant Deputy Inspector Eikhoff, of Detroit, Mich , himself a polisher, by having a small fan operated by a belt on the revolving shaft of the emery wheel, piping being attached to discharge the dust into a small tank of water, the discharge pipe being curved so as to deposit the dust in the water, having the cover of the tank of wirecloth so as to allow the air to escape. The fan would only be operated when the emery wheel was in motion.

ACCIDENTS.

The number of accidents reported as having occurred during the year is to date sixty-five, ten of which resulted fatally. Of the whole number ten have been caused by circular saws, three of which were fatal.

Regarding the fatal accident to James Hamilton, deceased rented power from the the factory for chopping grain. He had asked the engineer to slow down the speed of the engine in a little while, but did not wait until it had slowed down, and while standing on a bracket to put belt on pulley, taking hold of belt with both hands, it is supposed he lost his balance and grasped the revolving shaft with his right hand and the belt caught and broke, winding around his hand, breaking his arm and tearing it off near the elbow. The shock caused his death two hours after the accident.

James Carnegie while throwing off a belt was standing on a scaffold and inserted a broom handle betwixt the belt and pulley, when he was thrown to the ground, breaking his neck. He died about twenty-four hours after the accident. The deceased had previously, on several occasions, thrown the belt off the pulley, but it would have been safer to have manipulated the belt from the floor rather than from the scaffold on which he had to stand, as a belt mounter could have been used instead of a broom handle.

Robert Brady was pulling a shingle block around to the splitter saw with a short hook when the hook slipped and he fell on the saw, his head falling on one side of it and his body on the other. A frame with a hinged cover has since been placed over the saw. It is alleged that had the deceased used a longer hook, as was provided, and which would have entered more deeply into the shingle block, the accident would not likely have occurred.

John Papineau was not in the employ of the company. He was looking over the mill and premises when a car was coming in on the tramway; he backed or stepped over the tramway, a distance of eighteen feet, and was killed.

Edward Metcalf, supposed to have been rolling a log off the jack ladder in the shingle mill, and in attempting to check it to keep it from rolling entirely off the log deck, he had caught it with the cant hook and been thrown over the log, the log rolling on top of him with a drop of about a foot. He was found lying under the log, his head crushed. He only lived a few moments. No person saw the accident take place.

Alexander Lefevre was operating the edger and had passed a board through the saws, but, noticing one side had not been edged, he called for the board again, and instead of the men working with him carrying it back to him they lifted the guards and shoved it under them back to him. As it was passing the saws the men say he closed the saws which catching the board, was thrown with great force striking him in the upper part of the leg. He died about six hours after the accident.

Edward Smith was killed by the bursting of a heading jointer (wheel) in the factory in which he was working. It is alleged than no flaw was discernable in the parts of the wheel after the accident. Not having been notified for some days after the occurence—

fatal accidents require to be reported within twenty-four hours—I communicated with the manufacturers, who, in reply, stated that with the knives in the jointer balanced it might be operated at a speed of from seven hundred to twelve hundred revolutions a minute. It is alleged that the minimum speed was not exceeded at the time of the accident. I incline to the belief that the knives were at fault. It is to be regretted that an investigation had not been held immediately after the occurrence of the accident when the condition of all the parts of the jointer could have been ascertained. The coroner was notified but was under the impression that unless the relatives desired an inquest he could not hold one.

Antoine Choinard was operating the edger. One side of a deal not having been edged, he raised the binder, allowing the deal to ride the saw, which threw the deal with force against his body, killing him instantly. The deceased evidently intended to draw the deal back to edge it properly, overlooking the danger of its riding the saw, which it did with fatal result to himself.

Orman Allan was not employed in the mill. He was in the habit of playing around the mill and the yard. He had been repeatedly warned by the employees to keep away from the mill, and twice on the day he was killed, it is alleged, he was chased away from the place where he met his death. He was sitting on a platform outside the mill close to a revolving shaft, with a cord, used for tying lath, fastened on his wrist, and throwing the other end of the cord over the shaft, with the result that he was carried around the shaft and killed.

It is difficult to keep boys away from saw-mills, and parents who desire the safety of their children should be grateful to employees of mills who try to keep them out of danger, instead of prosecuting any who may be tempted to chastise a boy for impertinence, as was recently the case where a boy was sent out of a mill as a measure of safety.

The accidents recorded to date being only sixty-five shows a larger decrease than might otherwise be expected. The decrease may be attributed to factories in the earlier part of the year running shorter time and with a lesser number of employees than usual. It is to be regretted, however, that the number of fatal accidents is double that of last year—the fatal accidents last year being five, and the total number of accidents eighty-three.

EXPLOSIONS.

Three explosions have been reported to date. All explosions are required to be reported within twenty-four hours by the Factories Act, whether any person is injured or not. In neither of the cases was the Act complied with, the excuse being that they did not know the law required explosions to be so reported. As amendments to the Factories Act have been noticed in the inspectors' reports, and as copies of the reports are sent to all the factories, and in most cases copies of the amended Act as well, there is no excuse for ignorance. If the reports or amendments are not read the blame must remain with those who neglect to do so.

An explosion of a steam pipe of steam generator occurred at the Riordan Paper Mills, Merriton, on the 18th February last, expelling the steam throughout the furnace doors scalding James Dale very badly. The steam generator had been in use for two years, but has since been removed.

An explosion of a cooking retort occurred on the 13th October in the canning factory of Messrs. Boulter & Sons, Picton, by which Harry Wilson was badly scalded on the face, arms and chest. The door of the retort—there being three retorts of the same pattern—was fastened by five malleable iron lugs, two of which being defective gave way, thereby causing the accident. The retort was being used at the time for cooking pumpkins. The steam pressure was not supposed to exceed more than fifteen pounds, as should the pressure exceed that amount the goods being cooked would be apt to be scorched. The man in charge of the retorts was expected to prevent the steam pressure from rising above fifteen pounds, but as there was no safety valves on either of the retorts it was rather dangerous to depend on any man, however careful he might be, to regulate the pressure as required. In two other canning factories in an adjoining town retorts used in them had a valve on each retort, fitted so as to blow off at fifteen pounds pressure, so that there could not be an explosion while the valves were acting right. As a lug on one of the other retorts had broken about a year previously, I consider the lugs on all the retorts should then have been examined and replaced, if required, by other material than malleable iron. I found that although a week had elapsed since the accident the remaining lugs on the retorts had not then been examined. I recommended that boiler plate or steel should be substituted for malleable iron in the construction of the lugs.

An accident occurred while experimenting with a new can for holding carbide at the Carbide Works, St. Catharines, on the 15th October : "The can was filled with carbide and contained 100 pounds, and was thrown around from heights varying from one foot to five feet upon masses of broken jagged sharp pieces of carbide, with the idea of finding out how much illusage such a can would stand. In the course of this several holes were punched through the can by the sharp edges of the carbide upon which the package had been thrown. Being satisfied that the can was strong enough one of the men tried to take off the screw cap and found that it was wedged. In order to loosen the cap he put a shovelfull of red hot ashes from the furnace upon the cap and over the sides of the can. This caused the gas within the can to ignite, and a very mild explosion took place which blew some of the hot ashes in the face of the workman who put them there, burning slightly the skin of his face." As the man was not off work six days no report of the accident was required to be sent.

OVERTIME PERMITS.

Eighteen permits for overtime have been granted to factories during the year as against twelve during the previous year.

BAKE SHOPS.

While a great improvement has taken place in the condition of many of the bake shops, there is still room for more. In many of the bake shops, in the country especially, the bake shops are not lime-washed until the Inspector has made his visit, and evidently would take chances against his coming. Some occupiers of bake shops have pleaded that owing to the smoke from the oven the bake shop cannot be kept as clean as is required. They are told that if their premises are not kept as required, a prosecution would probably result in the loss of public patronage. Some, however, keep their premises in as satisfactory a condition as could be desired. The men, as a rule, keep the utensils, troughs, etc., clean, and appear desirous of carrying out the requirements of the Act.

HOURS OF LABOR.

Complaints as to the sixty hour limit being exceeded were made. In some cases parties complained of were notified that any infringement of the Act would result in prosecution for such infringement. I have not had any further complaints.

SUNDAY LABOR, 1897.

As amended at the last session of the Legislature, Sunday labor was prohibited, the reason for the amendment being that in some of the large bakeries the men were worked on Sunday evenings from about three to seven hours, and then were worked sixty hours during the week as well. More especially in Hamilton was this the case. I have been informed that for fifteen years the bakers in Toronto did not start work until four o'clock Monday mornings, and at five o'clock on other mornings of the week. There is no reason why bakers should work on Sundays and at night work now any more than then.

In Ottawa, as stated in my last report, the bakers are subjected to competition from Hull, where no Bake Shop Act exists. And, as stated to me, the Hull bakers deliver bread to the grocers in the French residential districts in Ottawa about five o'clock in the morning of Mondays. As no by law exists in Ottawa requiring Hull bakers to obtain a license, while in Hull a by-law exacts a fee of $20 from the Ottawa bakers, it is rather a hardship on the Ottawa bakers, but as they are in hopes of obtaining legislation to enact a similar law in Ottawa, they may yet be on a more equal footing. Permission was granted till the end of November, for those of the Ottawa bakers who applied for such, to work on Sunday nights, to afford them an opportunity to get the Ottawa Municipal Council to afford relief as indicated. It has been stated that the Legislature would require to amend the Municipal Act before the Ottawa Council can take any action in regard to the matter. A petition has been sent to the Attorney-General asking for the necessary legislation by the Retail Dealers' Association of Ottawa.

Permits were granted to the following Hamilton bakers to employ their workmen from nine o'clock on the Sunday night preceding the civic holiday in Toronto, on the representation that a large excursion party was expected from Toronto, and it would be necessary to work on Sunday night, in order to get out a sufficient quantity of bread to meet the increased demand therefor: Messrs. Harris Brothers, Lees & Sons, R. H. Chilman, E. W. Bateman.

I have the honor to be, Sir,

Very respectfully,

JAMES R. BROWN.

Inspector.

Toronto, 31st December, 1897.

EASTERN DISTRICT.

To the Honorable the Minister of Agriculture for Ontario:

Sir,—I beg to submit to you my annual report of inspection of factories in the Eastern District for the year 1897.

In making this report I am pleased to be able to testify to the vast improvement in the case of protecting the employees from dangerous machinery and providing for them better accommodation, more comfort and more facilities to escape in cases of fire. There are still, however, some factories where the employers seem to overlook the protection to some machinery which they consider of slight importance, and have to be repeatedly requested—almost at each inspection—to comply with the Act. In every instance the employer's answer to the order of the inspector has been that there is no necessity for it; there is no danger, and the request is unreasonable; and he looks upon it as if done merely for the purpose of showing our authority. I must say, however, that this is now the exception, as this year I have met with but one case of this kind, viz, where an elevator was run in a factory in Gananoque without safety catches, and where the employers expressed themselves plainly that there was no necessity for any.

I have found this year three elevators running without safety catches. In two cases the employers have promised positively to attend to the matter without delay. I also found some belting unprotected in four factories, and some minor machinery which could be somewhat better protected in a couple of small factories.

Another cause of accidents, to which I referred to in a previous report, and which I have observed also this year, although to a much less extent, is the manner in which some girls dress and carry their hair loose. Some of them I have observed this year in that state, cleaning and attending to the machinery under their control in most dangerous condition. The employer being himself aware of this danger, and having been requested by me to use his influence with these parties, has in several instances advised, and in some cases insisted that girls working around machinery should not wear their hair loose, and the employers would welcome any amendment to the Act in this respect.

SANITARY CONDITION.

As to the sanitary conditions of factories in my district, I have only to repeat what I have said in my previous report. In most cases the floors, walls and privies are kept clean and in a healthy condition, and in no instance had I any difficulty in this respect. All are supplied with separate water-closets ; but in old buildings the approaches are not separate, which I consider a great source of evil that cannot in certain cases be avoided, as no provision has been made in the construction of the building.

The ventilation during the summer season cannot be better, but in several instances where they have winter sashes, the ventilation during the cold season is not as good as desirable, and in many cases the air is only renewed by the opening of doors when passing through to leave or enter the rooms, as draughts caused by opening windows are considered dangerous and are feared by the persons at work in the rooms I hope that at the next international convention of inspectors this question will be fully discussed, and some proper means of ventilating factories during the winter will be suggested, which may be adopted by amended factory legislation.

It is a most difficult matter to fully superintend the sanitary conditions of stores and bake shops placed under the jurisdiction of factory inspectors, as they generally can make but one visit—at the most two—annually to the same place.

In order to ensure continual cleanliness in these places it would be necessary that they should also be regularly visited by the inspectors of local boards of health, and any violation of the Act reported to the factory inspector, or that they be themselves empowered to enforce the sanitary regulations.

CIGAR FACTORIES.

In my district there are a few cigar factories which I have inspected, and I must say they have not given me the same satisfaction with regard to their sanitary condition as other factories ; in some of them where young children are employed the habit of wetting the tobacco leaves with their tongues must be injurious to their health and conducive to bad habits ; in others—in the town of Brockville—not only have they not provided separate closets, but in one instance there are no closet accommodation whatever, except dilapidated ones in the rear end of the yard, although females are employed. In this case I have given due notice, and if not attended to at next inspection there will be a prosecution.

BOILER INSPECTION.

The Factories Act requires that all machinery used in factories be protected so as to render it safe from any possible accident to parties in charge. It goes further, and requires factories to be provided with all accommodations necessary to protect the health and morals of the employees, and the removal of all nuisance tending to injure them. But no laws exist to protect the lives of persons from the danger of exploding boilers, and no power is given to inspectors to ascertain the condition of boilers used. I have been informed this year at one factory that an old boiler, which had been through a fire and found unreliable, was sold and is now used in another factory with great danger to lives of persons. The danger from this source increases every year, as old corroded boilers, considered unfit for use in first class factories, are removed and bought up by owners of smaller establishments, whose sole effort and desire seems to be to economise, regardless of the welfare or protection of their employees. Not only in factories does the danger exist, but also wherever steam boilers are used. How often do we hear of accidents and sometimes loss of life by explosion of threshing boilers.

It therefore becomes a necessity, and it is to be hoped that the Government will supplement in the near future the Acts which they have so wisely enacted and put in force for the protection of life, the preservation of morals and health, with a general Act requiring that all boilers be properly and periodically inspected, and that no person be placed in charge of them unless they have received a certificate of competency and fitness from a proper board of examiners appointed for that purpose.

Fire-escapes and Means Provided to Put Out Fires.

In this case, as in every other, the manufacturers have endeavored not only to comply with the Act, but to render their establishments as safe as it was possible to make them from the danger of large fires, and in case of fires to provide sufficient means of escape for all persons therein employed, at the first alarm given. I must say that in a great number of cases they are provided with such fire extinguishers that one would feel it would be impossible for any fire to make headway during the time the employees are at work. In fact, a fire occurred in a large room of the Canada Cotton Factory in Cornwall during one of my inspections, and it was only when going through that room a few minutes later that we had notice of it, when we saw a remnant of smoke and everything drowned by water from their fire extinguishers. Notwithstanding these protections there is still a necessity for fire escapes, as the Act very wisely requires, and they must be more efficient, as very often the employees will allow valuable time to escape, depending upon these extinguishers to do their work, which they might fail to do, and allow the fire to spread rapidly, especially in cotton and woollen mills. In order to meet all requirements, and to be thoroughly efficient, fire escapes must be located so that at least one may be beyond the reach of the fire, and they must be known to all the employees, easy of access and safe to travel on, and each able to receive many persons at the same time.

I do not wish to repeat what I have said on this subjeet in my previous reports, but I must say that my observations have this year more than ever convinced me that no fire-escapes can be entirely reliable except the ordinary stairs in towers located at opposite sides of the building, separated from the main building by a fire-proof wall, and ordinarily used by employees to go to and from their work rooms.

Again, I have seen some factories provided with several iron out-stairs and balconies, uncovered, exposed to the weather, covered with ice, and thereby dangerous in case of a panic. These fire-escapes were located at windows very difficult to reach, through machinery and other material being crowded all around, as it was not a natural passage-way, and even in some instances these windows were provided with winter sashes, and no iron shutters to prevent the flame or smoke from rendering the stairs impassable in case of fire in that direction. In one case in Kingston I was myself prevented from reaching one of these fire-escapes, through machinery being crowded in the vicinity of the window.

Child Labor and Hours of Labor for Children and Young Girls.

By clause 5 of the Act it is illegal to employ young children, girls or women in a factory whereby their health may be injured; clause 6 and sub-section 1 show that the meaning of clause 5 is that it applies to the employment of boys and girls under fourteen years of age. It would therefore seem as if the inspector would have no control over the matter when children were of the statutory age of fourteen. I must say that I have found none employed who had not a proper certificate of age from their parents or guardians, but from the appearance of some of these children, I was very much in doubt if these certificates were truthful, and I felt from the manner these children would answer my questions that they were educated to falsely represent their age to obtain employment. Whilst the child labor evil has considerably decreased, we still find some employers who look upon the legislation passed by the Government fixing the minimum age at which children can be employed as a restraint of liberty of the subject, and they consider that the parents should have the unrestricted privilege to guide their children as they wish, or as they may be influenced by a desire to satisfy their cupidity or intemperance. Every person will admit the wisdom of the Government in passing laws to protect animals from the brutal treatment of their drivers or leaders, who are punished if guilty of cruelty. Then why not admit the necessity and wisdom of the Government in passing an Act for the purpose of elevating the young destined to form the future generations of this country to the highest standard of intellectual and physical condition, and to protect them from being dwarfed by an early confinement, and ruined morally by an early contact with a large number of mixed employees in factories, where obscene language is sometimes used and has a very contaminating influence over those of tender age.

I feel, however, that it is due to the employers that I should state that since the operation of the Act there has been a vast improvement in that respect, and I am pleased to testify that not only have they exercised a fatherly supervision over their employees but the employees form a very honorable part of the population in their locality. I consider that the further amendments with regard to employment of children in the direction I have suggested in my previous reports, and reduction of the hours of labor for the children, would have a very good effect, and would considerably diminish competition of child labor with that of adults.

I have this year granted but one permit ; that is to the Glove Manufacturing Co. of Brockville.

ACCIDENTS.

There have been only six accidents reported to me this year, of which one was reported only on my visit of inspection.

At Napanee, in the Gibbard furniture factory, L. C. McCoy lost part of his thumb by a rip-saw. The report is dated February 19th, 1897, but does not give the date of the accident.

In the Toronto Paper Mill, of Cornwall, one Asborne Latrice had his arm broken on a paper cutter. He had passed it through a wheel to clean the knife when it was stopped, but he accidently pushed the belt on the pulley with his leg, when the machine started before he had time to take his arm from the wheel. This accident occurred about the 14th of September, 1897.

In the Dominion Cotton Mills at Kingston, one Peter Donohue, on the 23rd September, had the flesh on one of his hands badly lacerated by being caught on a dirt roller on carding engine.

Two other accidents were reported to me in writing on the 14th October, 1897, by the Hawkesbury Lumber Co., as follows : One boy, 15 years, named Adolphe Mainville, had his arm badly injured by being caught upon live rollers. One other boy, Odilon Vallee, had two fingers cut off by a saw of a lath machine upon which he was thrown by another boy whilst they were playing together. This is one of the instances tending to show the necessity of allowing no children to work under sixteen years of age in saw mills, around machinery of a dangerous character. I have seen these two boys shortly after the accident, and they both appeared rather young for their work, although they were of the statutory age. The other accident, which was reported to me at my visit, occurred in the Gananoque Spring and Axle Factory, on the 22nd day of March, 1897, by which one M. Street had his arm crushed in gears.

When the law was first put in operation, many of the employers considered it as very offensive to them and interfering with their rights, but the inspectors have exercised their duties with such prudence and moderation, and with such impartiality, that they soon convinced the employers and employees that their sole object was to protect the lives and health of the latter, without creating or causing any unnecessary annoyance to the former; and now they all have become friendly and ready at all times to assist the inspectors in the carrying out of the provisions of the Act, and accept any suggestions made to them to provide more protection or comfort to their employees.

I have the honor to be, Honorable Sir,

Your most respectful,

O. A. ROCQUE, Inspector.

REPORT OF FEMALE INSPECTOR OF FACTORIES.

To the Honorable the Minister of Agriculture:

Sir,—I have the honor to submit the following report of factories inspection for the Province of Ontario for the year 1897:

My duties have taken me into nearly every city and town in the Province where there are factories, workshops, or mercantile establishments employing young girls and women.

In reviewing the work of this year there is no change of any radical nature to comment upon. A very general progress has been made, and many important improvements have been adopted.

The sanitary arrangements in factories and workshops I have found to require constant supervision, more especially in the smaller workshops, which are not at all times kept in a condition conducive to health. But the general condition of factories, from a sanitary point of view, are fairly good.

Though actuated with a desire to enforce all laws by which we are governed for the benefit and protection of the laboring classes, yet, in view of the depressed condition of business of all kinds in the first part of the year, it was necessary to be very careful not to make demands that were not absolutely necessary.

Very frequently when we ask that some changes be made, an appeal would follow asking for time, giving as a reason for the request hard times and lack of money—many saying that the expenditure of even a small sum outside of their business would be a hardship and an inconvenience, and others stating that it was with difficulty that they succeeded in keeping their business running under such unfavorable times.

Complaints.

I have given attention to all complaints whether signed or anonymous. I have had many correct ones, with a number very much exaggerated.

Many complaints have been that they have had to work in rooms without a fire. I have gone through some work-rooms where I found females working with their out-door jackets on. There is no provision in the Factories or Shops Act for ensuring that the temperature shall be maintained above a certain degree.

There is a provision in the laws of the State of Ohio, which empowers inspectors to interfere, when they find, upon inspection, that the heating or lighting of any shop or factory is such as to be injurious to the health of persons employed. Several complaints have been made to me regarding the discomforts of employees in offices, but, having no authority over such places, no material assistance could be rendered.

A number of complaints I have received have been of illegal overtime worked by women, beginning before and ending after the legal hours. In the case of some industries, it was alleged that work was carried on through meal hours. In others, that the intention of the Act was evaded by giving women work to finish at home. This has reference to the industries much affected by weather and fashion. There is much pressure in some months and slackness in others. In those cases the girls themselves often wish to take work home in order to make good wages when they can.

Complaints of want of drinking water in workshops is a serious matter, still out of our control, but which I have always pressed on the attention of employers.

My attention has been frequently drawn to the employment of girls in confectioners' stores, ice cream parlors, coffee houses and restaurants, that their hours were excessive; but it is a very difficult matter to regulate the hours in such places.

A good deal of time is taken up giving attention to complaints or information of infringements of the law. This part of the work has increased very much this year.

CHILD LABOR.

The law prohibiting the employment of children under fourteen years of age in most cases is complied with. The number of children employed has decreased very much during the year.

Much of the most serious opposition to the carrying out of the laws has come from the working people themselves. They force their children into the workshops or mills, and will even bear false witness as to their age, thus giving them their first lesson in deceit and falsehood. Every child employed in our workshops, factories, telegraph offices, mercantile establishments, takes that much from a grown-up person, besides lessening the compensation paid for such labor.

Our industries are numerous, and the demand for labor great. But nothwithstanding those facts, hundreds of our adult population are idle, and seeking employment, while the children are providing for the support of the family. This is in direct opposition to what it should be.

The lack of steady work has been the source of much privation and suffering among the laboring classes during the year.

CONTRACT MAKING OF CLOTHING.

The present year has been an unfortunate one for the most of those engaged in the manufacture of clothing. The continued depression in business has demoralized this trade. It is gratifying to report that there is a continued improvement visible in the surroundings of the people engaged in this calling. We find that a wholesome fear of the law has been impressed in the minds of a majority of those people, and as long as it is known that there will be a constant inspection of their premises, some attention will be given to the subject of cleanliness, and providing sufficient air space and sanitary arrangements.

The greatest tendency of the clothing trade appears to be against the establishment of large sanitary workshops. The employers who own the present ones complain of their hands leaving them and taking rooms as workshops, and taking clothing to make at a lower price. The facilities offered for the hire of sewing machines and other necessary tools are so easy that a workingman starting without any capital becomes an employer in the space of a week or two.

When separate closets are ordered for the use of male and female, and after such are provided, they use them indiscriminately. And so it is with all orders given to better the surroundings of the workers. They look upon an order to "clean up" as something both unnecessary and novel.

Another class of clothing-makers consists of simply the members of families living in rooms, and using the apartments as workshops. The law, at present, does not extend the authority of the inspector over the work done by families.

Inspection may mitigate but cannot abolish the evil while clothing can lawfully be made in tenement houses. We cannot force the wholesaler or contractor to pay a better price for the labor. We cannot send tenement workers out of the country; they are still coming, and, as a rule, they stay.

The object of the law is twofold, that is, to secure the manufacture of clothing under conditions of health and cleanliness, and to raise the condition of the workers. Were the wholesale manufacturers of clothing compelled by law to keep a register of the persons to whom they give out their goods, and of the places where these goods are made up, they would be more careful, and take a greater personal interest in a subject which directly concerns the public at large.

The regular custom tailor shops are in a fairly good condition, although considerable trouble has been met with in having their floors and water closets cleaned. We look for greater improvement yet. Continued attention has to be paid to cleanliness. They will allow their clippings of cloth and sweepings to accumulate for weeks if not looked after.

HOURS.

There is a very strong manifestation on the part of employees, in nearly all industries, to work a shorter time on Saturday than on the other days of the week, and in order to attain this end they petition us to grant them the right to use part of the time allowed for noon-day meal; but we have no power to grant any such permit. Such arrangement could not fail to be ultimately injurious to those who hurridly partake of the noon-day meal, and rush back again to the loom or spindle, six days of the week, in order that they might be able to quit earlier on Saturday. The only practical remedy is to make Saturday half-holiday a lawful right of every employee, without interfering with the lawful privileges they enjoy during the week. In cities, the Saturday half-holiday is becoming more popular. During the year I have noted that many more firms than previously give their employees the benefit of the half-holiday.

I think the suppression of all but unavoidable overtime would produce a marked improvement of the health and efficiency of females in all lines of business.

LAUNDRIES.

Sanitary arrangements, ventilation and hours of labor have received special attention this year, and I think we have got them pretty much into line with law. Proprietors of laundries find it difficult to adjust their work to the law limiting them to sixty hours per week, or ten hours per day.

In the summer months, Monday is their short day, and most of the employees have very little to do on that day, while all the other five days are busy ones, and many of the proprietors would be glad to run the full sixty hours in five days for the majority of their workers, but the law prohibits working more than ten hours' employment in any one day, except when a different appointment of the hours of labor for the sole purpose of making a shorter day's work on Saturday. So we have time tables arranged which usually provide for from five to eight hours on Monday, and divide from fifty-two to fifty five among the five remaining days. Notwithstanding the desire to secure observance of the law if possible without resort to its penalties, one case occurred which could not be overlooked with due consideration for the health of the females—that was Rolston's Laundry Co., 187 Parliament street, for working more than sixty hours in one week. He paid fine and costs. To extend leniency to those who persist in evading the provisions of the law is unjust to the law-abiding, and only serves to bring the law into disrepute.

SANITARY.

There has been a decided improvement during the year in the sanitary condition of factories and workshops. Several establishments have put in new and excellent closets, liberally flushed and well ventilated. Others, by attention to cleanliness and repair, have raised the standard of propriety and comfort. It is pleasing to know that sanitary regulations in factories and workshops are constantly improving, and no requirement of the law is more appreciated by most workers than in this respect.

I have to repeat again that there is great difficulty in always keeping lavatories in that condition of cleanliness in which they should be found. Unfortunately some employees give a great deal of trouble in workrooms by their abuse of such. Where closets are erected inside a workroom, or are made to open directly into a room, it is very difficult to ventilate satisfactorily, as the warmth of the workroom causes the air to pass through the closets to the workrooms. I think it should be made imperative on those using the closets to keep them clean and in proper order.

VENTILATION.

I do not think that there can be found any better ventilation than that of our large factories.

Many manufacturers have spent a goodly sum in putting in various systems which change the air at different periods and keep it as pure as can be, while others take great pains in locating the workrooms in the most airy part of the building. The classes of people who do not have the benefit of good ventilation are those employed in small factories and workrooms. The practicability of ventilating workrooms admits of no doubt. The time has been reached when the importance of ventilation is generally appreciated.

Good ventilation consists in the proper arrangement and distribution of the ducts for the incoming and the outgoing of the air, and their relation and correspondence with each other, in order to secure the perfect removal of the foul air and the thorough diffusion of the fresh air. How to supply workrooms with the proper quantity and quality of air has not always received the attention its merits demand.

Stale air is as unwholesome as stale water, and it is now one of the primary truths of sanitary science, that perfect drainage, good ventilation and cleanly surroundings are the necessary conditions of life. This is one of the important matters which comes under our notice as inspectors.

In some rooms gas irons are used for pressing purposes, and very unpleasant, to say the least of it, odors are given off. If, however, these gas irons are kept clean and the rooms properly ventilated by pipes or fans, as is done in some places, there can be little to complain about.

The use of electric light is becoming almost universal in workshops and factories, with most beneficial results. It is to be hoped that electricity will be substituted for gas in all processes, especially for heating flat irons in laundries and tailor shops. It would improve the atmosphere of those places very much.

NEW FACTORIES.

Section 28.—Every person shall, within one month after he begins to occupy a factory, serve on the inspector a written notice containing the name of the factory, the place where it is situated, the address to which he desires his letters to be sent, the nature of the work, the amount of the running power therein, and the name of the firm under which the business is to be carried on, and in default shall be liable to a fine not exceeding thirty dollars.

The increase of establishments of various kinds entails a vigorous and careful inspection. The opening of new industries is constantly going on.

The occupant of a new factory or workshop should report to the factory inspector his intention of commencing work at such a place, in order that it may be ascertained by the inspector that the premises agree with the requirements of the law. If manufacturers would consult with inspectors before taking premises or signing leases, expense could be saved in many cases. It is much better to know what is necessary than to have changes made afterwards, as we have to deal with the person who employs females, and not with the property owners. The substitution of "owner" for "employer" in tenement buildings would be an improvement, as we find one person is landlord of all the rooms and workshops. He neither occupies any of them himself nor employs any of the persons at work in them, and the numerous tenants who are constantly moving makes it almost impossible to have the law complied with.

CONVENTION.

Through your kindness I was permitted to attend the International Association of Factory Inspectors, in Detroit, in the end of August. Many very instructive papers were read, which caused general discussions as to the merits and demerits of the subjects which the writers treated.

By the comparison with the laws of other states, and the experience of officers entrusted with their enforcement, these gatherings of factory inspectors are conducive to much good, and bring about an interchange of views on subjects which might not otherwise be obtained.

I believe that the provisions of our own laws are now in the front rank with respect to legislation for the improvement of the conditions surrounding those who toil for a living in our workshops, mills and mercantile establishments.

Thanks are due to the Medical Health Officers of the various cities and towns who have always cordially responded to any calls made upon them, when the conditions and law seemed to warrant a request for their co-operation. Sometimes a state of affairs is discovered the remedy for which is within the power of the health authorities, and whenever such matters have been reported to them, prompt action has always resulted.

TRADE.

The material improvement of trade during the last six months has been particularly noticeable in manufacturing circles. Our inspections show that there is a considerable increase over the previous year in the number of persons employed, and that many plants which were shut down entirely are now again in active operation, also that others which were running on short time, or with reduced forces, are now conducted with full complement of hands and up to their regular capacity. We have noted that there is a tendency to work overtime in many lines of business. The outlook for the ensuing year, we are assured by employers generally, is bright, and from these reports it is fair to assume that the business revival is of a permanent nature.

SHOPS AND PLACES OTHER THAN FACTORIES.

This amended Act, with its greatly extended provisions, which came into operation in the month of May, was given over to the Factory Inspectors to enforce. It was a step in the right direction, and is doing much good throughout the Province. There has been no opposition manifested to the provisions of the law except in a very few cases.

I am pleased to bear testimony to the spirit of courtesy shown me in nearly every instance by employers, and the readiness with which suggestions have been received, as well as the promptness with which orders given have been carried out.

The eagerness with which women have received me as a woman, and the fact that by far the larger number of complaints I have received relate to unsanitary conditions, seems to emphasize the need there was for bringing under inspection the small as well as the large workshops.

When I began this part of the work I thought to make a thorough canvass and know every place both large and small in the Province, but in this I have been somewhat disappointed. There being so many small places, it consumed more time than I thought of. However, I think I have found nearly all the small tailor shops, cigar factories, and other small workshops, located in alleys, in rear of houses—in fact almost anywhere except where one would naturally look for a workshop. These places have employed from two to six persons. Rooms were small and not well ventilated. But I have not been able to make a second visit except at a few places besides, those who were violating the law in some way. At my second visit at those places, I found that in most cases the law had been complied with. Very little care or thought is given in such places to sanitary arrangements or cleanliness.

When I suggest some changes necessary to health and propriety, the reply often given by employers is that in their own homes the arrangements are equally bad. The force of this reasoning is doubtful, seeing that the existence of one evil, though greatly to be deplored, seems hardly a good excuse for the toleration of another and independent one.

Section 5 and sub-section 3 of the Act reads : "There shall be allowed to every child, young girl or woman, so employed, not less than one hour for the noon-day meal on each day."

Some of the complaints from shops have been that they did not comply with this law. After inspection I have found that such were correct. Others again were that the employers were prohibiting workers from leaving the premises during the meal time. I consider that the employer in doing so is going beyond his legal powers. The meal hour really belongs to the workers, to be used as they choose. The question is an interesting one and has several times come under my notice.

Sec. 13 : "If the inspector so directs in writing, the employer shall, at his own expense, provide a suitable room or place in the shop, or in connection therewith, for the purposes of a dining or eating room for persons employed in the shop."

Some firms have very generously fitted up dining rooms, with person in charge, and have supplied tea, coffee and milk at very low prices, also having a library attached to such rooms.

Sec. 9 : "In every shop in which any child, young girl, or woman is employed, there shall be provided, and kept, a correct register of the name, age, and place of residence of every such child, young girl or woman employed, and such registers shall at all times be opened to the free inspection of inspectors."

This section is very necessary, and I have found it very helpful to me in my inspections.

Sec. 8 : "The occupier of any shop in which females are employed, shall at all times provide, and keep therein, a sufficient and suitable seat or chair for the use of every such female, and shall permit her to use such chair or seat, when not necessarily engaged in the work or duty for which she is employed in such shop."

The injury to the health of females employed in workshops, factories and mercantile establishments, in consequence of their being compelled to be constantly on their feet, is undeniable. In many cases a female can perform her duties just as well sitting on a chair, stool or bench as she can standing. To require her to become unnecessarily exhausted, to simply gratify a silly whim and looks too much like tyranny.

I have visited some of the mercantile establishments quite frequently in order to see that the stools, when once provided, are kept in locations available for use by the saleswomen. I have heard no complaint that the privilege has been abused, or that the results have been hurtful in any way to the firm by which it was granted.

SANITARY.

The greatest difficulty in benefiting the small shops is their frequent removals. They are here to-day, and to morrow you have to search for them The evils of defective sanitary accommodation and ventilation are due in some cases to the bad construction of many buildings and rooms not originally intended for working purposes, which renders them almost incapable of improvement. Many old buildings are wholly or in part unfit, in a sanitary point of view, for occupation. In some of the towns we have been compelled to accept sanitary arrangements, which were far from being satisfactory, through lack of sewage system.

I have had to notice dressmaking and tailor workshops, where there is very deficient ventilation, and in the use of the gas stoves, as is generally the case, the effect upon the workers is exceedingly injurious.

Workrooms cannot be properly ventilated by means of windows, and I have frequently to speak about this matter. It is but a question of time when the minds of a majority of proprietors of all business houses will be convinced of the advisability of providing pure air in sufficient volume for the proper comfort of those employed, through the saving of time lost by sickness directly caused by poor ventilation, cold rooms and unsanitary conditions.

ABSTRACT.

I have a copy of abstract with my address posted in shops and places other than factories, as far as practicable.

I may say that the employers are usually heart and hand with us in our work, and often say, "If you have any suggestions to make, or there is anything out of order, we will put it right." This leads me to believe that under more favorable conditions of business we can accomplish more favorable results.

The duties required of us are to a great extent humanitarian in their nature, and perhaps the work is not fully appreciated by the public, nor do they realize the good accomplished. It may be said that the work of an inspector, in all its divisions, demands diligent and incessant labor, and must be continuous to be effective. No matter how well we may discharge our duty in any building or locality, we do not conclude that no further attention is needed in such places.

I have the honor to be,

Yours respectfully,

MARGARET CARLYLE, Inspector

ACCIDENTS REPORTED IN 1897.—WESTERN DISTRICT.

No.	Date.	Employers.	Place.	Business.	Person injured.	Age.	Particulars.
1	January 1	Massey, Harris Co	Brantford	Reapers, etc.	Fred. Cunningham	22	Struck above left eye and rendered insensible, by a piece of casting; he was grinding on emery wheel.
2	July 28	" "	"	"	Henry Harrison	40	Small bone of right arm broken; struck by a stick thrown from a saw.
3	August 2	" "	"	"	David Charters	45	First finger caught in a bending machine; flesh stripped off at first joint.
4	January 7	" "	Toronto	"	H. Kinsella	....	Put his finger in threaded hole in the end of buffer mandril rapidly revolving, it was drawn in and twisted off, leaving end of finger in hole.
5	March 9	" "	"	"	R. Hill	....	Finger cut by a circular saw; did not notice it was in motion.
6	July 3	" "	"	"	John Shaw	....	Hand went under the press; set screw caught hand and crushed the bones.
7	August 3	" "	"	"	W. Johnston, (boy)	....	Finger caught between flange on shipper rope and stop on the elevator and squeezed flat; amputated at first joint.
8	January 13	Universal Knitting Co	"	Hosiery	Clara Garner	....	Hair caught by set screw of driving shaft, beneath frame, tore out about two square inches; scalp not injured; stooping to pick up ticket.
9	" 16	McClary Mfg. Co	London	Stoves & tinware	W. Livermore	25	Middle finger, right hand, crushed in press.
10	" 17	" "	"	" "	Frank O'Neil	17	Two fingers, right hand, mashed in press.
11	March 27	" "	"	" "	Frank Lawson	17	Forefinger of left hand off at second joint by press; kept foot on treadle.
12	April 7	" "	"	" "	Mark Hea	18	First finger, left hand, off at second joint in a press.
13	June 27	" "	"	" "	Daniel Walsh	18	Middle finger off at first joint; cut off by cutting press.
14	Sept. 14	" "	"	" "	D. Stewart	27	Three fingers, right hand, crushed by a die falling on them.
15	October 28	" "	"	" "	Jos. Holman, jr	18	Left thumb cut off by stamping press.
16	January 22	Penman Mfg. Co., (Ltd.)	Thorold	Knit goods	J. Heysel	....	Index finger caught between gear and its casing, badly injuring it.
17	" 19	P. E. Shanty	Preston	Agrl. imp'ts	Chas. Watts	....	Thumb cut off at first joint by a buzz planer.
18	" 19	A. Filshie	Mt. Forest	Machinery	M. Foreman	....	Thumb of right hand cut off by shaper; did not use guard provided.
19	February 2	W. Gray & Sons	Chatham	Carriages	R. Maynard	....	Internal injuries; boring piece of wood, it ran up the auger and struck him; no bones broken.

ACCIDENTS REPORTED IN 1897.—WESTERN DISTRICT.—*Concluded.*

No.	Date.	Employers.	Place.	Business.	Person injured.	Age.	Particulars.
20	February 12	Guelph, Norway Iron & Steel Co.		Bar iron	Peter Carpenter		Fingers crushed while stamping iron under steam-hammer.
21	“ 13	“ “		“	Thos. Hemming		Ankle broken; struck by a piece of iron, while cutting with shears.
22	“ 12	McDonell Rolling Mills Co.	Toronto	“	Samuel Huntley	40	(Particulars given in report of Inspector.)
23	“ 23	Anderson Furniture Co., (Ltd.)	Woodstock	Furniture	Jas. Bryant		Three fingers of left hand cut with a buzz planer.
24	March 3	“ “	“	“	Rabt. Stevenson	19	Thumb cut off by a rip saw.
25	“ 22	“ “	“	“	Chas. B rlet		Leg caught between elevator and timber; scraped.
26	“ 15	“ “	“	“	Harry Rice	20	Thumb split open by buzz planer.
27	April 5	“ “	“	“	Walter Bamber	22	Three fingers severely cut by buzz planer.
28	“ 21	“ “	“	“	Chas. Horner	50	Left hand injured by grooving saw.
29	“ 21	“ “	“	“	Daniel Murray	26	First finger of left hand cut by a rip saw.
30	September 15	“ “	“	“	W. Atkinson	25	Two fingers and thumb cut by a rip saw.
31	February 24	Anthes Mfg Co	Berlin	“	Jas. Wilson		Two fingers badly cut by shaper.
32	“ 26	Dominion Cotton Mills Co	Brantford	Cotton	Minnie Judge	19	Flesh wound near elbow; cleaning in motion.
33	“ 20	London Furniture Co	London	Furniture	Fred. W. McLeod		Fatal; fell down elevator shaft twenty-seven feet, causing injuries resulting in death; was working at night; elevator was protected.
34	January 27	Taylor, Scott & Co	Toronto	Washboards, etc.	Man		Working at boiler and door fell down and broke his nose.
35	March 8	McPherson & Hovey	Clinton	Agrl. imp'ts	Wm. Baer		Three fingures injured by a shaper.
36	“ 12	Cobban Mfg. Co	Toronto	Mouldings, etc.	Man		Two fingers injured by buzz planer.
37	“ 21	Sutherland, Innes & Co	Alvinston	Staves	Roland Smith		Chest injured; stave block fell on him.
38	“ 16	Dick, Ridout & Co	Toronto	Bags	John Haynes		Hand and arm injured in calender rolls; arm amputated.
39	“ 26	A. A. Barthe'mes Mfg. Co.	“	Piano actions	B. Cosgrove		Right hand cut by saw.
40	“ 26	Gutta Percha & Rubber Co	“	Rubber goods	Geo. Holden		Fatal; burned by explosion of boiling varnish; died March 31st.
41	“ 26	“ “	“	“	Percy Holden		Fatal; burned by explosion of boiling varnish; died April 1st.
42	“ 26	Hemming Bros., Mfg. Co	“	Fancy goods	Walter Saunders	23	Part of finger taken off by drop-hammer.
43	April 21	Wortman & Ward Mfg. Co	London	Churns, etc.	Frank Parker	26	Piece of wood thrown from a saw struck him in the abdomen.
44	“ 22	C. Boeckh & Sons	Toronto	Brooms, etc	W. Chantler	18	Fell down elevator; injuries slight.
45	“ 22	“	“	“	Robt. Kirk	23	Finger cut off by tinsmith's shears

46	April	14	Bertram Engine Works Co	"	Engines	John Crawford	32	Index finger crushed in a printing machine.
47	June	9	" "	"	"	N. Williams		Head hurt by scaffold falling on it.
48	"	21	" "	"	"	A. Ford		Thigh bruised by a plate falling on him.
49	"	24	" "	"	"	Jas Munnal		Two fingers bruised by a shaft dropping on them; one amputated.
50	May	1	Guelph Woollen Mill Co		Woollens	Wm. Green		Jaw broken; struck by wood turning chisel.
51	June	24	Geo. H. Williams	Thorold	Baskets	Frank Force	20	Middle finger off at first joint by veneer clipper.
52	May	11	London Furniture Co	London	Furniture	Daniel Fisher	44	First finger, left hand, cut off by buzz planer.
53	August		London Furniture Co	London	Furniture	Aaron Bell	21	Three fingers of left hand partly off by buzz planer.
54	July	15	Northey Mfg. Co	Toronto	Pumps	Geo. Jones		Foot burned by stepping in open mould containing molten iron.
55	"	15	McBurney, Beatty & Co	"	Bicycles	Man		Struck by tube he was polishing.
56	August	13	Toronto Radiator Co	"	Radiators	R. Saville		Eye injured by hot babbitt metal splattering.
57	"	26	" "	"	"	Thos. Hall		Knee struck by cupola door, injuring ligament
58	"	26	" "	"	"	Wm. Everton		Walked in elevator; fell six feet; guard not in place.
59	October	12	" "	"	"	D. Fellas		Fell down elevator well and broke his leg.
60	September	16	Kretchtel Furniture Co	Hanover	Furniture	Theodore Luessing	23	Left hand badly bruised; removing chips from feed rolls of planer.
61	"	26	Goderich Organ Co	Goderich	Organs	J. W. McDonald		Two fingers off at first joint by buzz planer.
62	March	11	Coleman Lumber Co	Burlington	Planing	Man		Thumb cut by rip saw; idle forty-four days.
63	October	4	Brown & Wigle Co	Kingsville	Woollens	Gordon Loop		Hand badly lacerated, requiring amputation; put it in a waste duster.
64	"	4	John Harrison	Owen Sound	Planing	Fred. Redfern		Two fingers and thumb severed by a rip saw.
65	August	13	Armstrong Carpet Co	Guelph	Carpets	Lottie Woods		Finger injured in cog wheel of loom; had to amputate it at third joint.
66	October	14	Bell Organ & Piano Co	"	Organs	John Gilmour	55	Two fingers nearly severed by touching a rip saw accidentally.
67	"	20	John B. Snider	Waterloo	Furniture	Samuel Ruddy		Three fingers of left hand torn by rip saw; reached to clear fan pipe without stopping.
68	"	22	C Boeckh & Sons	Toronto	Brushes	Gillespie		Hand cut by circular saw.
69	"	26	The Campbell Fanning Mill Co	Chatham	Mills	Robt. Flater	73	Chest and body crushed; leaned into elevator and platform came down and caught him.
70	"	27	Mr. Eckhardt	Toronto	Coffins	Thos. Ledrow	30	Caught on overhead shafting and whirled around; bruised about body.
71	"	30	*Advocate* Printing Co	Guelph	Printing	Geo. Wreford		Ends of fingers of right hand squeezed in a press.
72	"		Waterous Engine Co	Brantford	Engines, etc.	Robt. Gilmore	18	Ends of four fingers taken off in lathe; got under the feed chain.
73	March	30	Can. School & Office Furniture Co	Preston	Furniture	Jas. Hay		Fatal; struck on abdomen by piece of stick thrown from a rip saw; died a week later.
74	"	29	H. Krug	Berlin	"	Gustave Roehr		Part of two fingers cut off by buzz planer.
75	November	9	Burnley Bros	Brantford	Laundry	Maggie Cheerers		Hand caught in mangle and crushed.

ACCIDENTS REPORTED IN 1897.—WESTERN DISTRICT.

No.	Date.	Employers.	Place.	Business	Person injured.	Age.	Particulars.
76	" 10	Penman Mfg. Co	Port Dover	Knitted goods	Thos. Martin	......	Arm caught between cylinder and doffer of finisher card and badly mangled; no bones broken; cleaning in motion.
77	" 1	Waterous Engine Works Co	Brantford	Machinery	N. Wildfang	......	Repairing brickwork of cupola; a fall of bricks took place burying him beneath, lacerating his head and one arm.
78	" 9	Farmers' Binder Twine Co	"	Twine	Mrs. McMullen	......	Dress sleeve caught in slow running pulley, breaking a couple of bones; cleaning in motion.
79	" 10	The Forbes Co. (Ltd.)	Hespeler	Woolens	Gilbert Markle	......	Thumb cut off in coils of valve spring.
80	" 18	Gurney Foundry Co. (Ltd.)	Toronto	Stoves	Robt Ward	......	Top of finger cut off.
81	" 17	Penman Mfg. Co. (Ltd.)	Port Dover	Knitted goods	Alfred Ryan	.....	Arm broken on hydro-extracter; adjusting of cloth sticking out.
82	" 18	McKay Mfg. Co.	London	Tinware	John Graves	......	Left hand crushed by drop press; omitted to remove foot from treadle.
83	" 24	Bennett Furniture Co	"	Furniture	Jas. Quin	.....	Left thumb cut off at first joint by shaper
84	" 24	Hanover Mfg. Co	Hanover	"	H. Wiegard	......	Struck by board thrown from a rip saw.

ACCIDENT REPORT.—CENTRAL DISTRICT, 1897.

No.	Date.	Employers.	Place.	Name of person injured.	Age.	Particulars.
1	March 1	Uxbridge Piano and Organ Co	Uxbridge	*James Hamilton	24	While putting belt on pulley on main shaft his right hand caught and arm was torn off at elbow. Died about two hours after the accident.
2	" 26	Joseph Simpson	Toronto	*James Carnegie	19	While throwing belt off pulley with a broom handle he was thrown to the floor, neck broken; he died about 24 hours after accident.
3	May 11	Huntsville Lumber Co	Huntsvillle	*Robert Brady	26	While pulling shingle block around the splitter saw, the hook slipped and he fell on the saw. Killed instantly.
4	June 18	Spanish River Lumber Co	Spanish River	*John Papineau	35	Fell off a tramway a distance of 18 feet and was killed.
5	August 17	Bank of Toronto	Fenelon Falls	*Edward Metcalf	21	Supposed to have been rolling a log off the jack ladder in the shingle mill. Was found lying under the log, his head crushed; only lived a few minutes.
6	" 30	J. R. Booth	Ottawa	*Alexander Lefevre	38	Struck by a board thrown back from a circular saw. Died six hours after.
7	September 3	W. H. Mathews	Trenton	*Edward Smith	18	Heading jointer wheel burst. Killed instantly.
8	" 25	Gilmour & Co	Canoe Lake	*Antoine Choinard	40	Struck by a deal thrown by a circular saw and killed instantly.
9	" 30	Gilmour & Co	Trenton	*Orman Allan	13	Carried around a revolving shaft and killed.
10	January 19	B. Greening Wire Co	Hamilton	L. Turner	22	Ends of two fingers taken off in wire drawing block.
11	" 26	S. & H. Bortridge	Ottawa	Marcel Lortie	17	Left hand badly injured in picker cylinder.
12	February 8	B. Greening Wire Co	Hamilton	William Tribbeck	60	First and third fingers of left hand injured on circular saw.
13	" 12	Kemp Mfg. Co	Toronto	Timothy McCarthy	20	Ends of three fingers of left hand cut off on drop hammer.
14	" 18	Riordan Paper Mills	Merriton	James Dale	49	Explosion of steam pipe, scalded very badly from his waist down.
15	March 17	The Valley City Seating Co	Dundas	Robert Manning	16	First finger of left hand cut off, and second and third fingers injured on jointer.
16	" 20	Kemp Mfg. Co	Toronto	William Smithson	25	Second finger of right hand cut off on power press.
17	" 23	H. A. Lozier & Co	Toronto Junc	Harry Blackstock	15	Arm slightly cut on machine.
18	" 31	A. R. Clarke & Co	Toronto	James White	40	Left arm crushed betwixt cylinders of putting-out machine; amputated at shoulder.
19	April 8	Gilmour & Co	Trenton	Hiram McGuire	35	Fell off platform; leg fractured below the knee.
20	" 8	McLaughlin Carriage Co	Oshawa	E. Saint	......	Part of thumb and fore finger of right hand cut off on buzz planer.
21	" 23	The Rathbun Co	Deseronto	C. Reynolds	15	Circular saw cut into instep while standing on saw table.
22	May 5	Ottawa Car Co	Ottawa	Harry Edridge	42	Third finger cut off at second joint, and index finger injured on tenoning machine.
23	" 7	Huntsville Lumber Co	Huntsville	George Elliott	21	Right hand badly mangled on circular saw.

*Fatal.

ACCIDENT REPORT.—CENTRAL DISTRICT, 1897.—*Concluded.*

No.	Date.		Employers.	Place.	Name of person injured.	Age.	Particulars.
24	"	7....	Canadian General Electric Co...	Peterboro'......	M. Collins	25	Both bones of left arm fractured below elbow; by whiffle-tree breaking while moving car.
25	"	10....	Hawthorne Woollen Co	Carleton Place..	Frank Connors	14	Two fingers of right hand lacerated in cylinders of first breaker.
26	"	18....	Harris & Campbell	Ottawa.	Leon Decourt	19	Lost four fingers of left hand on buzz planer.
27	"	22....	Riordan Paper Mills.....	Merriton	Joseph Allan	28	Slipped against revolving knife of wood-barking machine; flesh wound on left arm.
28	"	26....	Specialty Mfg. Co.............	Newmarket	William Mosier	19	First finger of right hand taken off on power press at first joint.
29	June	2....	Firstbrook Bros	Toronto...	William Nicholls......	30	Face and hands burned; while emptying barrel of fine dust in furnace.
30	"	3....	Joseph Simpson	"	Arthur McDona'd.....	16	Thumb crushed in wool picker.
31	"	19....	The Rathbun Co	Deseronto.....	Bennie Martin	24	Heel crushed in cogs of live rolls.
32	"	19....	Norton Mfg. Co	Hamilton	Fred Scott	18	Tip of index finger of right hand cut off in power press.
33	July	12...	Canada Screw Co	"	Patrick Gray..........	44	Upper lip bruised and several teeth knocked out by handle of crane.
34	"	20....	Can.Col'd Cotton Mills Co. (Ltd).	Merriton	Thomas Campbell	29	Countershaft torn out by belt; caused severe wound on back, and body badly bruised.
35	"	24....	The Rathbun Co....	Deseronto.....	Alexander Young	45	Cut across the left leg and three cuts on hip; not having saws out of gear while oiling up.
36	"	29....	Copp, Clark & Co	Toronto........	Ernest Dobson .. .	14	Knee grazed; apron caught in gear of press.
37	August	3....	The Dowsell Mfg. Co.........	Hamilton	John Nolan	35	Caught in belt; badly bruised and shoulder dislocated.
38	"	14....	Rathbun Co..........	Gravenhurst....	Bemis Lemyre	35	Revolving mandril caught his shirt and threw him; his hip, face and leg cut.
39	"	18....	Wm. Cane & Son's Mfg. Co	Newmarket	William Taylor........	24	Second and third fingers on right hand cut on circular saw.
40	"	23....	Kemp Mfg. Co	Toronto	George Smithson	22	Small piece of thumb of right hand cut off on power press.
41	"	24....	Hamilton Blast Furnace Co.....	Hamilton	Joseph Schoff	27	Piece of pig iron fell off pile; foot badly bruised.
42	"	13....	South River Lumber Co	South River...	Isaac Houston.........	......	Top of second finger on right hand cut off on circular saw.
43	September	4....	Kemp Mfg Co.........	Toronto.......	William Smithson	25	Part of first finger on right hand cut off on power press.
44	"	13....	Riordan Paper Mills......... ..	Merriton	William Suckling.....	37	First joint of second and third fingers of left hand cut off on shaper.
45	"	17....	Norton Mfg. Co	Hamilton	James Thornton	14	A belt struck a can-body in his hand, cutting first finger on right hand to the bone.
46	October	2....	Hamilton Blast Furnace Co.....	"	George March.........	22	A piece of pig iron rolled off a pile; toe of left foot crushed
47	"	22....	" "	"	Abe. Granside.	......	Burned on shoulder and arm; holding his leading stick over his head and hot iron fell on him.
48	"	2....	McLaughlin Carriage Co.......	Oshawa	James Northey.... ..	45	Loss of two fingers on buzz planer; planing too short a piece of timber.
49	"	29....	Capital Planing Mills.	Ottawa.........	J. Normande..........	34	Three fingers of left hand cut off on circular saw.

50	" 13....	W. Boulter & Sons..........	Picton	Harry Wilson	17	Scalded on body, arms and hand by explosion of cooking retort.
51	November 6....	St. Lawrence Foundry Co.....	Toronto	C. J. Ellis	30	Fingers crushed in cogs of crane, but will not loose fingers.
52	" 10....	B. Greening Wire Co	Hamilton	Albert Mitzner........	17	Nail on third finger of left hand off and bone bruised; crushed by end of crate which he was carrying.
53	" 4....	The Rathbun Co...............	Lindsay........	Thomas Masson	16	Two fingers cut on shingle jointer saw.
54	" 11....	"	"	Edgar Hepburn	32	Parts of three toes taken off in gear near the floor.
55	" 29....	Ontario Cotton Mill Co	Hamilton	Robert Nevill	15	First joint of middle finger of left hand taken off on square band at end of mule.
56	" 30....	Hamilton Cotton Co	"	George Moore	15	Compound fracture of left leg; leg caught by band and pulled between the cylinders of spinning frame.
57	December 4....	Hamilton Cotton Co..........	Hamilton	Harriet Warburton	14, 6m	While cleaning a moving frame in motion, little finger of left hand crushed and amputated.
58	November 29 ...	Canadian Colored Cotton Co	Merriton	Charles Ware..........	28	Fell while running to put out a fire, and strained tendons of right shoulder.
59	December 3....	Norton Mfg. Co	Hamilton	W. Mayo.....	16	Taking hold of a running belt; fore finger of right hand broken.
60	" 13 ..	Hamilton Blast Furnace Co.....	"	Edward Reizer	45	Side and hip bruised by falling off a car.
61	" 18....	Hamilton Cotton Co	"	*Robert Marshall.......	15	While looking over guard-bar at elevator door, elevator descended and caught his head, fracturing skull; died ten minutes after accident.
62	" 21....	Uxbridge Piano and Organ Co ..	Uxbridge	William Graham	......	Points of fingers on right hand cut off on buzz planer.
63	" 23 ...	Office Specialty Mfg. Co	Newmarket	Geo. Close	17	Point of fore finger on right hand cut off on power press.
64	" 21....	Dodge Split Pulley Co....	Toronto Junc ..	Andrew Kearns	......	Point of middle finger cut off at nail, and third finger of right hand lacerated in gear of drill.
65	" 23....	" "	" " ..	Geo. Granby	16	First finger on left hand lacerated between bolt and guide of shears.

*Fatal.

REPORT

OF THE

INSPECTOR OF LEGAL OFFICES,

1897.

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1898.

FIFTEENTH ANNUAL REPORT

OF THE

INSPECTOR OF LEGAL OFFICES.

To the Honourable Sir Oliver Mowat, K.C.M.G., Lieutenant-Governor of the Province of Ontario :

SIR,—I have the honour to present the fifteenth annual report of the Inspector of Legal Offices for Ontario upon the affairs and condition of the judicial and administrative officers under my inspection for the year ending 31st December, 1897.

The following officers have been appointed during the year :

Sheriffs.—Archibald McNabb, Esquire, as Sheriff of the United Counties of Stormont, Dundas and Glengarry, in the room and stead of D. E. McIntyre, Esquire, deceased—gazetted 13 February; John R. Gemmill, Esquire, as Sheriff of the County of Kent, in the room and stead of John Mercer, Esquire, deceased—gazetted 13th March; Robert G. Reynolds, Esquire, as Sheriff of the County of Huron, in the room and stead of Robert Gibbons, Esquire, resigned—gazetted 24th April.

Local Masters and Deputy Registrars of the High Court of Justice.—J. Franklin Hart, of the Town of Windsor, Esquire, barrister-at-law, as Local Master and Deputy Registrar of the High Court of Justice for the County of Essex, in the room and stead of A. H. Clarke, Esquire, resigned—gazetted the 6th February; Robert K. Cowan, of the City of London, Esquire, barrister at-law, as Local Master and Deputy Registrar of the High Court of Justice for the County of Middlesex, in the room and stead of James Shanly, Esquire, deceased—gazetted the 17th April; J. J. A. Weir, of the Town of Berlin, Esquire, barrister-at-law, as Local Master of the High Court of Justice for the County of Waterloo, in the room and stead of His Honour Judge Lacourse, deceased—gazetted the 5th June; His Honour Judge Doyle, of the Town of Goderich, Junior Judge of the County of Huron, as Local Master of the High Court of Justice for the said county, in the room and stead of S. Malcolmson, Esquire, deceased—gazetted the 18th September.

County Attorneys and Clerks of the Peace.—J. A. Ritchie, of the City of Ottawa, Esquire, barrister at law, as County Crown Attorney and Clerk of the Peace for the County of Carleton, in the room and stead of N. A. Belcourt, Esquire, resigned—gazetted 10th of April

Local Registrars, Clerks of the County Court and Surrogate Registrars.—Joseph Tait, of the City of Toronto, Esquire, as Registrar of the Surrogate Court for the County of York, in the room and stead of J. Gordon Brown, Esquire, deceased—gazetted 2nd January; Thomas H. Murray, of the Town of Sault Ste. Marie, Esquire, as Local Registrar of the High Court of Justice, Clerk of the District Court and Registrar of the Surrogate Court for the District of Algoma, pro tempore, in the room and stead of T. A. P. Towers, Esquire—gazetted 31st July.

SHERIFFS' OFFICES.

The work of the sheriffs' offices has been well done during the year, and few complaints have been made, and none of them of a serious nature. A few complaints have been made of the charges for mileage in cases where the writs were not served and on executions where no money was made by the sheriffs. The general rule in this respect is well known, that no charge for mileage on a writ of summons is allowable where the writ has not been served, and that mileage cannot be charged on writs of execution where money is not made on or under pressure of the writ. In the cases referred to me there has generally been some special circumstances which seemed to make the charges justifiable, but the rule is very strict, and in all cases where special instructions have not clearly taken the cases out of the general rule I have disallowed the charges. If the sheriffs would in all cases pay regard to this strict rule there would be no reason for complaint. Returns of executions and payment of moneys made thereunder have been promptly made. The civil business of the sheriffs' offices has been gradually growing less from year to year, and the incomes of some of the officers has become comparatively small.

In Appendix A I have set out in tabulated form the statistical returns made by sheriffs for the year 1897.

LOCAL MASTERS.

The business done in the offices of the Local Masters has greatly fallen off during the last few years, and the returns for this year show a still further decline. I have had no complaints during the year of the undue prolongation of proceedings in the Master's office. The statistical returns of business in the offices of Local Masters for 1897 are tabulated in Schedule B.

LOCAL REGISTRARS, DEPUTY REGISTRARS, DEPUTY CLERKS OF THE CROWN AND COUNTY COURT CLERKS.

The new Rules of Practice which came into force on first January last have led to a considerable correspondence between the clerks and myself, and I have been able in this way to solve many of the difficulties which have presented themselves to the officers. I am anxious that any difficulties or doubts arising in actual practice may be referred to me in order that the greatest uniformity possible may be secured in dealing with the very varied and complex matters which are daily to be dealt with by these officers. I am therefore glad the officers are so generally submitting their difficulties to me in regard to questions of practice.

The Reporter's Fund has occasioned me a great deal of correspondence which might be avoided if the officers would immediately after each Assize pay the proper amount into Court and fill out the necessary blank and return it at once to the accountant's office.

Schedule C is a return of all business transacted in the offices of Local Registrars, Deputy Registrars and Deputy Clerks of the Crown for the year 1897 ; and Schedule D is a tabulated return of business done in the County Court Clerk's offices for the same period.

SURROGATE REGISTRARS.

The work of these officers has generally been well done during the year. In one instance I found the copying was considerably in arrears and gave directions that it should be immediately attended to. In some cases I found stamps had not been put on all the papers, and I caused the omissions to be supplied. There has been a less number of references to me during the past year than formerly on questions of Surrogate practice. This is no doubt owing to the fact that in most questions of doubt the practice has been pretty well settled.

Appendix E hereto is a return of business transacted in the offices of the Surrogate Registrars for the year 1897.

COUNTY ATTORNEYS AND CLERKS OF THE PEACE.

In these offices the duties continue to be well performed. Their fees are all audited by officers appointed by the County Councils. I have not had any appeals made to me during the past year. No doubt these Boards are doing better service than formerly and their decisions becoming more uniform.

GENERAL REMARKS.

The annual returns required to be made to me have this year been more promptly received than ever before. In many cases, however, I have been obliged to send them back for explanations, a necessity which could easily be prevented by a more careful preparation of them in the first instance.

I have made a number of inquiries from time to time during the year in respect of the duties of the various officers placed under my inspection by Order in Council of 5th April, 1895.

The amounts paid to the Provincial Treasurer by officers under my inspection under 57 Vic. cap. 9 on the incomes of the year 1897, are as follows :

Sheriffs	$696 42
Local Registrars, etc	3,323 44
County attorneys, etc	329 31
Total	$4,349 17

I have during the year required new securities to be given by several officers where in consequence of death, removal or insolvency, etc., of the sureties the securities had become unsatisfactory.

In Schedule F, I have set out a detailed statement of the fees and emoluments of the several officers for the year 1897; and in Schedule G I have, for convenience of reference, shown the total and net receipts of officers for 1897, and the earnings of each officer payable by the Government, the county and the general public respectively.

I have the honour to be, Sir,

Your obedient servant,

JAMES FLEMING,
Inspector.

OSGOODE HALL, TORONTO,
Feby. 14, 1898.

APPENDICES.

APPENDIX A.—Containing in tabulated form Statistics as returned

Counties or districts.	Number of Services of Writs of—					
	Summons.		Subpœna.		Order for arrest and *Ca. Sa.*	
	H. C. J.	C. C.	H. C. J.	C. C.	H. C. J.	C. C.
Algoma	8	9	4	17	....	....
Brant	13	7	21	53	....	....
Bruce	31	23	13	51	....	....
Carleton	123	46	46	42	....	....
Dufferin	23	6	8	10	....	....
Elgin	27	14	9	33	....	3
Essex	15	17	25	199	....	....
Frontenac	23	8	2	....	....	....
Grey	20	7	8	21	....	1
Haldimand	2	....	1	8	....	....
Halton	10	5	2	11	....	....
Hastings	34	14	5	58	....	....
Huron	25	5	4	15	2	....
Kent	25	18	15	49	....	....
Lambton	14	10	6	31	....	....
Lauark	23	4	6	16	....	....
Leeds and Grenville	49	29	10	21	....	1
Lennox and Addington	12	3	1	....	....	....
Lincoln	49	22	9	19	....	....
Middlesex	21	18	29	50	2	2
Muskoka	5	3	127	88	....	....
Nipissing	7	5	....	7	....	....
Norfolk	5	7	1	....	....	....
Northumberland and Durham	21	11	10	46	....	....
Ontario	17	2	3	17	....	....
Oxford	61	27	13	9	....	1
Parry Sound	6	5	....	17	....	....
Peel	13	9	9	14	1	....
Perth	18	15	12	10	....	....
Peterborough	35	19	1	1	....	....
Prescott and Russell	27	8	4	9	....	....
Prince Edward	15	14	4	12	....	....
Rainy River	13	9	5	31	....	....
Renfrew	23	16	3	6	....	1
Simcoe	25	26	22	8	2	....
Stormont, Dundas and Glengarry	38	21	10	....	....	1
Thunder Bay	10	4	1	3	....	1
Victoria	12	8	....	2	....	....
Waterloo	18	9	15	10	....	....
Welland	18	11	1	16	....	....
Wellington	23	11	6	24	....	....
Wentworth	42	30	3	1	....	....
York	23	11	3	179	....	....
Toronto	156	55	11	1	3	....
Totals	1,178	601	488	1,215	10	11

by the different Sheriffs for the year ending 31st December, 1897.

Miscellaneous process served.		Total number of Services.	Number of Estreats received.		Number of Writs of Execution.					
					Against both goods and lands received.		Against lands only received.		Against goods only received.	
H.C.J.	C. C.		H.C.J.	C. C.	H.C.J.	C. C.	H.C.J.	C. C.	H.C.J.	C. C.
9	8	55	......	......	15	25	......	20	......	2
4	1	99	......	......	16	8	......	17	......	3
19	5	142	......	......	24	24	......	......	......	......
58	8	323	......	......	38	33	......	23	......	......
2	......	49	......	......	9	8	......	12	1	......
8	4	98	......	......	19	15	1	32	......	......
6	6	268	1	......	38	21	......	39	......	......
7	3	43	......	......	18	4	2	......	2	3
1	1	59	......	......	24	14	1	35	......	......
3	2	16	......	......	2	5	......	......	......	......
2	3	33	......	......	15	10	......	6	......	......
14	7	132	......	......	42	14	......	21	......	......
9	1	61	......	......	19	29	......	21	......	......
12	4	123	......	......	32	28	1	41	......	1
8	3	72	......	......	17	14	......	16	......	......
8	3	60	......	......	12	5	......	8	......	1
14	13	137	......	......	46	45	6	1	......	......
5	4	25	......	......	15	2	2	7	......	......
9	......	108	......	......	20	43	......	......	......	......
9	14	145	......	......	29	35	......	......	......	......
1	......	224	......	......	4	3	......	3	......	......
2	1	22	......	......	6	10	......	18	......	......
1	......	14	......	......	6	12	......	16	......	5
4	8	106	......	......	35	27	......	26	......	3
1	3	43	......	3	25	14	......	14	......	......
35	7	153	......	1	20	19	......	19	......	......
4	1	33	......	......	4	10	......	6	......	......
3	1	50	......	......	10	11	......	10	......	1
3	2	60	......	......	24	9	......	......	......	......
14	12	82	......	......	20	24	......	20	......	2
2	7	57	......	......	12	10	......	17	......	......
7	4	56	......	......	13	14	1	5	......	......
13	9	80	......	......	17	43	......	3	......	......
......	......	49	......	1	8	27	......	10	......	......
11	4	98	......	......	20	37	1	45	......	2
4	......	74	......	......	12	27	5	19	......	3
11	3	33	......	......	16	15	1	1	......	......
4	1	27	......	......	19	21	......	23	......	......
1	4	57	......	......	18	14	1	9	2	......
9	2	57	......	......	11	11	2	17	......	......
17	3	84	......	......	39	25	......	27	......	......
9	1	86	......	......	38	29	2	32	......	......
8	7	231	......	4	36	28	......	24	......	1
43	13	282	......	......	234	133	7	20	......	......
414	183	4,100	1	9	1,097	955	33	683	5	27

APPENDIX A.—Containing in tabulated form Statistics as returned by the

Counties or districts.	Number of Renewals of Writs received.					
	Against both goods and lands received.		Against lands only received.		Against goods only received.	
	H.C.J.	C. C.	H.C.J.	C. C.	H.C.J.	C. C.
Algoma	2	4	8	9	....	....
Brant	2	6	1	3	1	....
Bruce	3	2	3	1	....	1
Carleton	....	....	2	4	....	....
Dufferin	1	1	2	3	2	1
Elgin	....	2	2	....	1	....
Essex	....	....	3	....	....	....
Frontenac	3	3	....	2	5	....
Grey	....	....	4	14	2	4
Haldimand	1	2	....	....	....	....
Halton	1	....	....	5	....	1
Hastings	....	....	17	17	14	16
Huron	2	6	1	8	....	....
Kent	4	3	6	12	4	1
Lambton	4	10	5	16	1	....
Lanark	....	3	....	9	....	1
Leeds and Grenville	....	....	....	3	....	3
Lennox and Addington	....	....	....	....	....	....
Lincoln	3	3	....	....	....	....
Middlesex	2	1	2	10	2	4
Muskoka	....	3	....	1	1	1
Nipissing	2	....	....	....	....	....
Norfolk	....	2	....	....	....	....
Northumberland and Durham	2	8	1	11	....	1
Ontario	5	6	7	7	....	....
Oxford	....	....	2	4	....	....
Parry Sound	3	....	3	2	....	....
Peel	....	....	4	3	....	1
Perth	....	....	3	1	3	1
Peterborough	2	9	1	2	....	1
Prescott and Russell	1	1	....	....	....	....
Prince Edward	....	....	....	....	....	....
Rainy River	....	11	....	....	....	....
Renfrew	4	....	....	....	....	....
Simcoe	3	....	5	25	....	7
Stormont, Dundas and Glengarry	....	7	4	10	4	2
Thunder Bay	2	8	3	7	....	....
Victoria	7	8	....	....	5	4
Waterloo	1	1	....	1	....	....
Welland	....	....	....	1	....	1
Wellington	....	2	....	....	....	....
Wentworth	6	14	12	23	4	....
York	....	....	43	19	4	1
Toronto	....	....	182	83	21	18
Totals	66	126	326	316	74	70

different Sheriffs for the year ending 31st December, 1897.—*Continued.*

Number of Sales under Writs of Execution.				Number of cases entered under the Creditors' Relief Act.	Number of Certificates received under this Act.	Assignments to Sheriffs under R. S. O. 1887, chap. 124.	Amounts endorsed on Writs of Execution against goods (not renewals.)	
(1) Against goods.		(2) Against lands.					(1) For Debt or Damages.	
H.C.J.	C. C.	H.C.J.	C. C.				H. C. J.	C. C.
							$ c.	$ c.
....	2	3	2	4	....	....	31,545 24	5,558 78
....	....	....	....	....	....	....	245,821 69	3,227 21
3	1	1	1	3	4	....	10,750 13	10,881 72
....	....	....	....	....	....	....	67,638 94	9,536 35
1	....	....	1	1	....	1	12,627 43	2,166 82
2	....	....	....	2	....	....	24,995 35	2,993 04
....	3	....	2	....	....	1	35,730 88	5,628 92
2	....	1	1	2	....	....	26,911 65	1,500 50
....	1	2	....	1	1	1	16,712 22	3,129 47
2	....	....	....	1	....	....	1,383 91	1,801 27
....	....	1	....	....	....	....	14,412 75	2,672 14
3	....	....	4	7	5	5	845,122 83	6,421 40
1	1	....	....	2	....	3	22,893 32	6,632 45
2	5	1	1	7	....	1	20,730 29	5,511 02
2	1	1	2	5	....	1	30.359 85	4,180 47
....	....	....	....	....	....	....	12,344 58	1,962 88
6	4	2	1	13	7	12	74,355 52	20,601 49
....	....	....	....	....	....	2	23,095 41	836 84
....	2	....	3	5	....	....	358,791 59	8,477 38
....	1	3	1	6	....	....	31,139 66	8,846 15
....	....	....	....	....	....	2	2,579 71	892 55
....	....	....	....	....	....	....	4,673 95	3,308 76
....	2	1	1	4	....	1	3,126 56	5,444 17
2	1	1	1	7	1	1	22,661 58	8,109 03
2	....	....	....	2	....	3	37,314 65	4,151 54
2	1	1	1	6	....	6	21,792 42	4,848 14
....	....	....	....	....	....	....	11,335 20	1,753 18
1	....	1	1	3	1	....	22,253 14	5,037 39
2	....	1	....	5	....	....	15,491 03	2,338 57
....	....	1	....	....	....	....	698,182 05	4,399 49
2	1	1	....	3	1	....	14,567 72	2,554 69
....	1	....	....	1	6	....	775,436 71	4,859 03
....	2	....	....	....	....	....	105,412 28	22,328 52
....	1	....	....	....	....	....	3,115 67	6,717 11
3	4	....	....	6	3	....	78,089 44	8,379 49
1	1	1	2	1	1	4	37,433 68	6,010 29
....	....	1	1	2	....	....	81,398 63	9,120 13
....	1	....	....	....	....	....	37,683 27	6,138 72
2	2	....	1	5	....	2	28,440 77	4,749 16
1	....	....	2	3	....	....	10,901 36	2 434 31
4	....	1	....	6	....	1	91,867 10	5,848 22
3	1	3	2	1	10	....	48.558 73	5.795 88
2	....	....	1	2	....	....	60,591 35	7,187 48
6	3	....	1	6	....	....	505,301 24	32,571 75
57	42	28	33	122	40	47	4,625,571 48	277,043 90

APPENDIX A.—Containing in tabulated form Statistics as returned by the

Counties or districts.	Amounts endorsed on Writs of Execution against goods (not renewals).—*Con.*		Amount realized by Actual Execu	
	(2) For Solicitor's Costs taxed.		(1) Against Goods.	
	H. C. J.	C. C.	H. J. C.	C. C.
	$ c.	$ c.	$ c.	$ c.
Algoma	917 72	1,024 00	....	69 34
Brant	1,675 99	337 17	....	....
Bruce	2,614 60	941 18	811 00	156 80
Carleton	2,843 66	1,011 81	....	....
Dufferin	236 65	229 08	90 25	....
Elgin	1.205 96	501 89	31 30	....
Essex	1.805 33	449 81	....	282 71
Frontenac	902 72	166 92	146 10	....
Grey	1,616 69	244 93	....	36 00
Haldimand	80 09	135 42	430 00	....
Halton	372 98	225 98	....	....
Hastings	4,887 97	440 03	768 60	....
Huron	596 49	798 52	53 30	45 00
Kent	2,670 48	1,276 42	383 00	500 25
Lambton	1,705 57	423 19	221 75	130 07
Lanark	929 67	143 66	....	....
Leeds and Grenville	3,506 06	1,343 63	1,539 66	644 92
Lennox and Addington	1,484 08	34 80	....	....
Lincoln	969 05	492 82	....	575 73
Middlesex	1,811 77	898 93	....	9 10
Muskoka	....	37 06	....	....
Nipissing	464 62	342 49	....	....
Norfolk	190 22	374 06	....	281 81
Northumberland and Durham	2,757 52	1,018 21	402 34	....
Ontario	1,015 47	259 00	770 33	....
Oxford	3,009 77	594 18	1,003 20	175 00
Parry Sound	100 49	118 59	....	....
Peel	1,281 36	450 20	300 00	....
Perth	1,269 93	450 00	358 42	....
Peterborough	609 70	473 65	....	....
Prescott and Russell	786 20	161 49	145 50	256 29
Prince Edward	1,454 04	319 16	....	379 20
Rainy River	1,343 28	1,268 73	....	671 00
Renfrew	374 64	497 74	....	35 00
Simcoe	1,987 77	740 49	2,824 38	511 29
Stormont, Dundas and Glengarry	1,580 18	493 88	256 15	100 00
Thunder Bay	843 08	749 51	....	....
Victoria	1,611 01	886 97	47 47	....
Waterloo	720 83	700 47	....	391 25
Welland	313 65	130 22	1,000 00	....
Wellington	570 97	621 81	742 93	....
Wentworth	3,023 90	942 66	541 55	272 41
York	2,170 01	636 94	175 46	....
Toronto	14,818 09	5,080 37	852 92	1,486 20
Totals	75,230 26	28,468 07	13,895 61	7,009 37

different Sheriffs for the year ending 31st December, 1897.—*Concluded.*

Sales under Writs of tion. (2) Against Lands.		Amount realized under Writs of Execution Without Sale.		Amount received for Fines, Penalties, etc.		Amount received under Writs of *Ca. Sa.*	
H. J. C.	C. C.	H. J. C.	C. C.	H. C. J.	C. C.	H.C.J.	C. C.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
568 50	22 98		77 84				
		359 66	670 20				
20 00	325 00	1,240 83	1,003 09				
		7,146 89	313 19				
			281 55				
			72 05				
	61 00	7,863 70	1,920 30		15 20		
185 53	145 00	770 29	195 40				
390 00	20 29	715 60	982 45		35 00		34 99
		221 32			30 00		
50 00							
	1,236 66	1,425 64	294 70				
		1,726 07	1,369 44				
190 00	73 00	219 59	145 20		110 00		
155 06	351 60		772 31				
		227 37	36 00		20 00		
285 00	20 00	3,628 62	1,335 82				
	370 00						
296 85	121 40	1,296 23	114 65		220 00		
			556 98				
	125 00	135 06	1,764 86				
63 29	120 75	545 67	267 74				
			657 62				
150 00	184 75	203 52	940 50		40 00		
		587 69	493 47				
258 59	33 85	968 37	1,270 56				
181 00		1,790 21	450 93				
50 00		157 66	170 00				
127 00		445 71	848 96				
		350 93	75 11				
		15 90	629 31				
			1,333 78		54 90		
		25 00	1,715 87	20 00	15 00	66 00	
545 40	240 10	605 04	1,018 73				
500 00	100 00	460 65	136 44				
		913 14	180 64				
	101 00		76 25				
	229 00		852 10				
510 00		1,833 92	660 83				
334 40		1,056 25	476 06				
		6 00	128 03		99 75		
	200 00	1,204 55	1,821 25				
4,860 62	4,081 38	38,147 08	26,110 21	20 00	639 85	66 00	34 99

APPENDIX B.—Being a return of business transacted by Local Masters through

Counties or Districts.	Number of Orders made for the following purposes.					Number of examinations taken as special examiners or otherwise before trial.
	For administration of estates. (1)	For partition or sale of property. (2)	In relation to infants under R. S. O. chap. 137, s. 3. (Examination only) (3)	Under Winding-up Acts. (4)	Other orders made in Chambers. (5)	(6)
Algoma	......	......	......	......	......	......
Brant	......	......	......	......	6	......
Bruce	......	......	......	......	36	33
Carleton	......	1	......	......	121	46
Dufferin	2	......	......	......	15	1
Elgin	4	......	......	......	......	21
Essex	......	1	......	......	......	10
Frontenac	......	1	......	......	3	13
Grey	4	......	......	......	35	13
Haldimand	......	1	......	......	......	......
Halton	......	......	......	......	......	......
Hastings	4	......	......	......	45	20
*Huron	1	2	......	......	4	......
Kent	3	1	......	......	7	36
Lambton	......	1	......	......	6	2
Lanark	1	......	......	......	......	2
Leeds and Grenville	3	1	......	......	30	4
Lennox and Addington	1	......	......	......	6	2
Lincoln	......	1	2	......	8	......
Middlesex	1	5	......	......	......	28
Muskoka and Parry Sound	......	......	......	......	......	......
Nipissing	......	......	......	......	1	......
Norfolk	......	......	......	......	2	......
Northumberland and Durham	1	......	......	......	4	......
Ontario	......	......	......	......	10	1
Oxford	2	1	......	......	......	21
Peel	......	......	......	......	18	......
Perth	2	......	......	......	5	5
Peterborough	2	......	......	......	51	......
Prescott and Russell	......	1	......	......	......	......
Prince Edward	......	......	......	......	....	4
Renfrew	......	......	......	......	4	3
Simcoe	1	1	......	......	38	13
Stormont, Dundas and Glengarry	1	1	......	......	67	......
Thunder Bay and Rainy River	......	......	......	......	2	......
Victoria	5	2	......	......	50	......
Waterloo	......	......	......	......	......	......
Welland	1	......	......	......	......	......
Wellington	4	2	......	......	73	45
Wentworth	......	2	......	......	29	......
Totals	43	25	2	......	676	323

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* From 12th September, 1897.

out the Province of Ontario during the year ending 31st December, 1897.

Number of Judgments or Orders brought into the Master's Office for taking the following accounts, etc.

Administration of estates. (7)	Executors', trustees' or committees' accounts and compensation. (8)	Foreclosure of mortgage or bond. (9)	Redemption of mortgage or bond. (10)	Sale under mortgage or agreement. (11)	Account on any charge or lien on land, other than Mechanics' Liens. (12)	Account under Mechanics' Lien Act. (13)	Specific performance. (14)	Partnership accounts. (15)	Alimony. (16)	Partition or sale. (17)	Damages for breach of contract or covenant. (18)
...	...	...	...	...	...	...	...	...	...	...	...
...	2	5	...	1	...	...	...	...	...	...	...
...	...	1	1	...	1	...	...	...	...	...	...
2	2	20	...	9	...	...	...	...	...	1	2
2	1	...	...	...	...	...	...	...	...	...	...
...	...	4	...	...	1	...	...	...	...	...	...
...	...	5	...	...	...	1	...	...	...	1	...
...	...	6	...	...	1	...	...	1	...	1	...
3	...	...	...	...	1	...	...	1	...	...	...
...	4	...	...	3	...	...	...	...	...	...	...
1	...	1	...	...	...	...	...	...	...	...	...
4	1	...	...	2	...	...	...	...	...	...	...
1	...	...	...	...	...	...	...	...	...	...	...
3	...	1	...	...	...	...	...	...	1	...	...
...	...	...	...	...	...	...	...	...	2	1	...
1	...	...	...	7	...	...	...	...	...	...	1
3	...	9	...	1	...	...	...	...	...	1	1
2	...	...	...	2	...	...	...	...	...	...	...
...	...	4	...	...	1	...	...	...	...	1	...
...	2	2	...	...	...	2	1	1	...	...	...
...	...	1	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	1	...	...	...	...	...	...
...	...	1	...	...	...	...	...	...	...	...	...
1	1	2	...	...	...	...	1	...	...	1	...
5	2	...	...	2	...	...	...	...	...	1	1
...	...	2	...	2	...	...	...	...	...	...	...
2	...	...	1	4	1	1	...	...	1	...	...
2	2	5	...	1	...	1	...	...	...	...	...
1	1	1	...	1	...	...	...	...	...	1	1
...	...	2	...	...	...	...	...	...	...	...	...
...	...	1	...	1	...	...	...	...	...	...	...
2	...	4	...	1	...	1	...	...	...	...	...
2	...	1	...	4	...	...	...	...	...	1	...
...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...
2	...	2	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	1	...	...	...	...	1
9	...	5	...	1	...	...	...	...	...	3	1
3	...	14	...	3	...	3	...	...	...	2	1
51	18	99	2	45	7	10	2	3	4	15	9

Appendix B.—Being a Return of Business transacted by Local

Counties and Districts.	Number of Judgments or Orders, etc.—*Con*						
	Work and labor done. (19)	Money received, paid, advanced or lent. (20)	Goods sold and delivered. (21)	Promissory notes, bills of exchange. (22)	Bonds, life and fire insurance. (23)	Infants' estates. (24)	Quieting title matters. (25)
Algoma							
Brant							
Bruce							
Carleton	1		1				
Dufferin		1					
Elgin			1				
Essex							
Frontenac							
Grey							
Haldimand							
Halton							
Hastings							1
Huron							
Kent							
Lambton							
Lanark							
Leeds and Grenville							
Lennox and Addington							
Lincoln							
Middlesex		1					
Muskoka and Parry Sound							
Nipissing							
Norfolk							
Northumberland and Durham							1
Ontario							
Oxford							
Peel							
Perth							1
Peterborough			1				
Prescott and Russell							
Prince Edward							
Renfrew							
Simcoe							1
Stormont, Dundas and Glengarry							
Thunder Bay and Rainy River							
Victoria		1					
Waterloo	1						
Welland							
Wellington							1
Wentworth	1						1
Totals	3	3	3				6

Masters throughout the Province of Ontario, etc.—*Concluded.*

luded.									
Lunacy. (26)	Miscellaneous. (27)	Number of advertisements of sale issued (28)	Number of reports issued. (29)	Number of references pending at date of return. (30)	Number of bills of costs taxed by Master. (31)	Amount realized by sales held under the direction of Master. (32)	Amount of costs of reference, etc., taxed by Master or under his direction. (33)	Amount of commission allowed in administration and partition matters, (34)	Amount of fees earned by Local Masters. (35)
						$ c.	$ c.	$ c.	$ c.
....	....	1	3	1	3	....	....	....	56 25
....	....	1	9	1	7	7,500 00	648 85	....	131 00
....	1	2	2	5	4	895 00	788 90	....	106 15
....	4	12	61	3	72	59,562 00	9,147 74	1,290 00	2,661 80
....	....	....	4	2	5	....	139 83	410 75	102 54
....	3	2	10	8	22	5,200 00	1,444 65	1,091 67	1,032 77
2	....	2	8	4	7	....	638 16	....	203 00
....	....	2	13	2	8	3,575 13	596 13	578 00	375 95
....	....	7	9	4	11	7,726 00	1,547 78	683 00	338 33
....	....	5	7	3	7	9 525 00	754 43	....	110 25
....	....	2	2	....	2	2,250 00	123 14	....	35 00
....	9	1	14	8	17	4,400 00	2,323 00	358 00	1,006 80
....	....	3	4	2	8	3,550 00	1,021 59	63 00	83 95
....	....	2	7	1	18	5,700 00	850 00	263 00	315 00
....	....	2	5	1	3	3,100 00	705 20	....	103 50
....	....	5	7	6	7	4,000 00	449 44	....	148 10
1	....	2	21	3	30	5,267 07	2,001 14	604 34	455 63
....	3	2	7	1	13	3,930 00	2,751 75	172 00	302 20
....	....	1	12	3	14	5.050 00	1,500 50	251 25	679 56
....	....	2	6	6	15	7,140 00	559 39	428 55	473 97
....	....	....	....	....	....	....	....	....	56 00
....	1	....	....	....	....	....	....	....	4 70
....	....	....	2	1	3	....	107 81	....	20 12
....	....	....	5	....	7	....	627 54	....	134 30
....	....	2	5	3	5	6,200 00	....	160 00	286 80
....	....	5	12	5	8	14,200 00	457 12	760 58	1,459 20
....	....	4	4	....	3	....	384 23	....	56 55
....	....	11	17	1	19	24,680 58	1,507 25	729 37	804 76
1	....	4	11	2	7	6,000 00	542 87	401 60	283 00
....	....	1	2	3	2	....	271 99	....	107 10
....	....	1	5	....	3	10 00	251 56	174 20	145 55
....	....	....	2	2	4	....	251 63	....	57 70
1	....	3	10	5	2	1,530 00	1,284 07	839 59	548 35
....	....	7	8	8	13	12,610 00	1,060 65	187 00	289 20
....	....	1	....	....	....	....	....	....	9 00
....	....	2	10	8	12	9,925 00	1,130 00	382 00	186 80
1	....	....	....	1	2	....	175 70	....	44 40
....	....	....	1	3	....	....	....	....	37 78
1	1	10	30	11	20	12,532 00	1,281 09	668 80	1,337 01
3	3	4	23	10	41	3,000 00	2,029 14	958 00	662 96
10	25	111	258	127	424	229,057 78	39,354 27	11,454 70	15,252 53

APPENDIX C.—Being a return of all business transacted by Local Registrars, Deputy during the year ending

Counties or districts.	Number of writs issued.	Number of orders for arrest issued.	Number of actions entered in Procedure Book.	Number of *Lis pendens* issued.	Number of *Præcipe* orders issued.	Number of orders issued and signed by Local Judges.	Number of examinations of parties.	Number of actions entered for trial.	
								By jury.	Without jury.
Algoma	31	.....	21	1	7	24	7	1	9
Brant	57	.....	50	5	25	34	.....	10	7
Bruce	65	...	53	12	26	36	33	14	7
Carleton	274	......	245	7	121	96	73	27	58
Dufferin	57	.....	38	15	11	.....	9	2	8
Elgin	128	.....	107	8	51	56	33	12	22
Essex	140	1	121	11	46	41	46	20	46
Frontenac	114	.....	89	6	24	69	13	6	13
Grey	98	......	87	14	21	14	17	16	13
Haldimand	21	.....	20	1	4	5	12	5	7
Halton	13	......	13	2	6	12	...	2	2
Hastings	153	......	106	10	72	31	23	8	32
Huron	86	2	67	6	29	26	12	18	13
Kent	80	1	73	12	39	16	54	10	16
Lambton	73	......	69	4	34	20	48	13	18
Lanark	70	......	54	1	18	24	9	8	7
Leeds and Grenville	84	......	83	8	10	3	19	6	17
Lennox and Addington	38	......	30	8	20	8	24	11	2
Lincoln	69	......	60	4	47	42	8	7	11
Middlesex	273	......	200	15	102	88	57	18	36
Muskoka	12	......	11	1	......	5	......	....	....
Nipissing	22	......	19	......	5	14	6	3	6
Norfolk	35	.....	32	......	11	5	9	5	4
Northumberland and Durham	70	.....	36	2	31	18	21	8	4
Ontario	60	.....	55	......	18	1	6	3	9
Oxford	99	......	88	10	54	37	56	8	23
Parry Sound	8	.....	9	.....	4	1	1	2	2
Peel	201	......	117	6	14	20	4	1	5
Perth	87	.....	76	10	50	56	24	18	19
Peterborough	125	......	102	8	44	...	22	6	15
Prescott and Russell	22	......	16	....	7	.....	3	1	5
Prince Edward	30	......	27	2	6	11	6	2	5
Rainy River	40	......	40	1	23	81	21	1	8
Renfrew	53	......	50	8	3	30	4	2	6
Simcoe	107	2	87	12	51	42	42	28	6
Stormont, Dundas and Glengarry	120	......	80	5	42	59	....	18	14
Thunder Bay	14	......	17	3	9	20	11	....	9
Victoria	36	....	16	4	9	8	7	6	3
Waterloo	57	...	43	5	15	25	16	9	7
Welland	42	.....	35	7	21	16	17	5	12
Wellington	85	......	79	8	35	4	15	6	11
Wentworth	284	......	244	15	156	113	75	52	43
York	1,650	3	1,072	104	867	......	......	153	208
Totals	5,183	9	3,937	361	2,188	1,211	863	551	768

Registrars and Deputy Clerks of the Crown throughout the Province of Ontario, 31st December, 1897.

Number of judgments entered without trial.	Total amount of such judgments without costs.	Total amount of costs taxed thereunder.	Total amount of disbursements allowed thereunder.	Number of judgments entered after trial.	Total amount of such judgments without costs.	Amount of costs taxed thereunder.	Total amount of disbursements allowed thereunder.
	$ c.	$ c.	$ c.		$ c.	$ c.	$ c.
10	10,025 97	443 96	134 79	3	880 19	284 89	144 55
15	16,247 53	455 58	137 79	7	9,548 26	1,384 33	489 27
17	6,778 25	844 17	265 55	8	1,890 00	468 54	340 08
97	109,277 06	7,566 24	3,098 54	47	24,304 04	6,448 06	2,203 40
7	5,241 41	113 30	34 54	3	52 18	664 15	209 88
21	43,947 95	407 98	142 81	19	5,495 00	2,115 31	824 64
37	26,035 64	1,671 69	614 71	20	16,534 79	3 089 22	1,631 20
40	71,482 62	1,091 31	384 57	24	13,111 01	3,523 29	1,861 68
11	5,065 41	172 46	50 17	13	8,970 78	1,758 59	704 74
10	9,822 58	357 91	121 83	3	500 00	754 16	278 27
5	5,873 35	48 50	19 63	5	1.121 74	67 85	79 30
30	37,725 47	587 97	141 26	26	14,143 89	2,826 24	1,450 84
11	20,927 13	316 11	107 93	15	3,115 64	1,945 67	778 60
19	14,201 18	464 78	137 19	15	2,465 13	590 96	156 06
7	2,664 80	284 13	67 63	12	1,898 18	1,470 38	605 46
17	15,753 00	543 99	146 03	6	1,248 00	1,139 00	681 36
24	28,904 20	576 37	151 98	18	20,862 67	1,183 38	732 28
12	15.042 70	230 89	62 79	8	360 00	1,238 99	506 17
21	334,097 36	409 99	134 89	6	3,657 64	1,266 02	394 55
73	60,891 00	1,623 75	435 03	27	14,202 97	2,600 80	920 95
2	......	......	......	......	......	......	......
3	690 43	115 31	23 31	4	......	197 74	114 91
9	4,171 43	227 74	59 17	8	1,200 00	547 31	257 80
19	21,601 44	691 29	208 63	6	1,249 33	1,059 15	402 29
17	17,659 13	320 23	102 32	9	2,012 32	432 23	316 41
6	19.353 34	1,003 05	99 73	13	6,027 34	890 57	446 55
1	735 68	36 35	......	......	......	......	......
6	236,695 01	246 67	72 20	3	204 30	271 56	168 74
25	17,069 90	391 24	82 59	23	2,652 00	1,785 80	663 60
35	30,375 13	1,029 86	300 19	9	1,952 50	1,773 28	910 28
5	4,525 41	191 08	63 26	2	2,100 00	271 73	126 35
11	12,032 87	500 08	431 24	1	5,250 00	353 42	260 50
4	101,458 84	885 96	526 78	1	1,516 47	30 60	9 90
20	15,599 15	482 40	129 00	3	556 63	134 53	83 60
24	94,072 79	543 79	145 67	8	1,527 08	1,846 00	518 47
29	31,274 12	1,043 61	257 37	8	3,531 24	928 33	119 60
3	2,627 53	85 55	22 30	2	2,391 49	544 27	222 78
10	14,696 00	514 00	174 00	1	......	454 00	260 00
21	30,211 97	624 07	163 85	6	4.450 61	928 40	90 88
6	3,222 61	112 09	40 30	7	2,830 24	432 07	179 57
35	56,870 89	500 71	154 92	6	2,930 25	1,230 15	276 86
67	72,031 76	2,424 37	700 52	37	17,582 50	5,485 61	1,469 69
......	......	......	......	......	......	......	......
842	1,626,980 04	30,180 53	10,147 01	342	204,326 41	54,416 58	21,892 06

APPENDIX C.—Being a return of all business transacted by Local Registrars, Deputy during the year ending

Counties or districts.	Number of judgments.						Number of executions issued against goods and lands.
	Over $10,000.	$10,000 and above $5,000.	$5,000 and above $2,000.	$2,000 and above $1,000.	$1,000 and above $500.	$500 and under.	
Algoma	......	......	1	2	4	6	4
Brant	......	2	1	3	5	11	22
Bruce	......	......	......	3	4	4	8
Carleton	......	1	21	23	32	61	78
Dufferin	......	......	1	1	1	7	5
Elgin	1	2	7	3	3	24	23
Essex	......	......	6	9	10	17	22
Frontenac	2	1	8	8	8	15	33
Grey	......	......	1	3	6	14	13
Haldimand	......	......	1	3	2	6	2
Halton	......	......	1	1	3	5	8
Hastings	2	......	4	6	8	36	31
Huron	......	1	2	4	5	14	8
Kent	......	......	2	3	9	9	19
Lambton	......	......	......	1	5	13	5
Lanark	......	......	1	7	1	12	16
Leeds and Grenville	1	1	3	7	6	21	19
Lennox and Addington	......	1	2	......	2	15	10
Lincoln	1	......	2	4	8	6	17
Middlesex	......	2	8	12	13	48	54
Muskoka	......	......	......	......	......	......	......
Nipissing	......	......	......	......	......	2	3
Norfolk	......	......	......	5	......	12	4
Northumberland and Durham	......	1	3	3	9	9	17
Ontario	......	......	2	5	8	11	19
Oxford	......	......	4	5	2	9	9
Parry Sound	......	......	......	......	......	1	1
Peel	1	......	1	1	1	4	4
Perth	......	1	1	4	2	40	20
Peterborough	......	......	4	7	14	19	24
Prescott and Russell	......	......	......	2	1	4	1
Prince Edward	......	1	1	3	8	1	4
Rainy River	1	1	1	1	1	......	4
Renfrew	......	1	2	1	3	8	5
Simcoe	1	1	1	3	9	3	13
Stormont, Dundas and Glengarry	......	2	3	4	6	13	17
Thunder Bay	......	......	......	2	3	......	14
Victoria	......	......	3	2	1	5	12
Waterloo	......	1	6	3	7	10	14
Welland	......	......	1	2	1	9	6
Wellington	2	......	5	2	5	4	12
Wentworth	1	3	8	11	16	51	56
York	......	......	......	......	......	......	421
Totals	13	23	118	169	232	559	1,077

Registrars and Deputy Clerks of the Crown throughout the Province of Ontario, 31st December, 1897.—*Concluded.*

Amount of money paid into Court.	Number of writs of *Ca. Sa.* issued.	Number of days of sitting of Judge with jury.	Number of days of sitting of Judge without jury.	Number of estreats ordered to be issued.	Number of estreats issued.	Amount of jury fees paid County Treasurer.	Amount of fees collected in law stamps by Deputy Clerks and Local Registrars.	Amount of fees collected in law stamps by Deputy Regi-trars.
$ c.						$ c.	$ c.	$ c.
248 60	....	1	9	....	....	3 00	135 00	....
....	....	8	8	....	....	30 00	283 00	....
....	....	11	5	....	....	18 00	430 75	....
1,302 40	....	17	11	....	....	84 00	1,012 70	221 40
....	....	7	....	....	....	6 00	209 10	....
....	....	11	4	....	....	36 00	548 40	....
....	....	11	6	....	....	36 00	540 75	25 20
....	....	7	3	....	....	18 00	625 15	....
....	....	9	2	....	....	48 00	464 75	....
....	....	6	2	....	....	15 00	130 00	....
....	....	2	1	....	....	....	94 15	....
....	....	8	8	....	....	18 00	258 10	527 00
175 00	2	5	5	....	....	33 00	346 00	....
233 00	....	10	7	....	....	15 00	267 00	216 00
....	....	10	5	....	....	39 00	315 20	....
25 00	....	7	....	....	....	24 00	350 30	....
....	....	3	10	....	....	18 00	405 90	....
....	....	8	....	....	....	33 00	245 40	....
....	....	5	3	....	....	21 00	194 60	57 70
300 00	....	10	10	....	....	54 00	846 40	158 30
....	....	11	....	....	....	....	47 80	....
....	....	1	1	....	....	9 00	73 20	....
....	....	4	3	....	....	15 00	160 40	....
....	....	9	4	....	....	21 00	303 30	....
....	....	3	3	....	....	9 00	224 15	....
....	....	8	4	....	....	24 00	311 10	44 10
....	....	2	....	....	....	....	26 60	....
....	....	1	2	....	....	3 00	380 20	....
....	....	7	8	....	....	27 00	531 20	....
8,440 89	....	7	5	....	....	18 00	543 10	....
....	....	4	....	....	....	3 00	122 00	....
....	....	2	2	....	....	6 00	180 00	....
....	....	1	4	....	....	....	197 60	....
....	....	2	1	....	....	6 00	246 90	....
....	2	11	5	1	1	51 00	214 20	52 20
....	....	9	....	....	....	54 00	565 80	....
....	....	....	3	....	....	....	95 85	....
5 00	....	6	3	....	....	12 00	144 80	....
....	....	7	4	....	....	27 50	259 00	....
....	....	5	....	....	....	15 00	215 50	....
....	....	5	4	....	....	18 00	450 80	....
87 87	....	16	20	....	....	156 00	1,227 70	343 07
....	....	....	....	....	....	....	....	....
10,817 76	4	277	175	1	1	1,023 50	14,223 85	1,644 97

APPENDIX D.—Being a return of business transacted by County Court Clerks

Counties or districts.	Number of Writs of Summons issued.	Number of Orders for Arrest issued.	Number of Actions entered in Procedure Book.	Number of *Lis pendens* issued.	Number of *Præcipe* orders issued.	Number of Orders issued and signed by Local Judge.	Number of Examinations of parties.	Number of Actions entered for Trial.	
								(a) By Jury.	(b) Without Jury.
Algoma	37	....	33	......	8	36	2	2	3
Brant	34	...	30	......	5	15	......	5	3
Bruce	55	......	35	6	16	....	17	3	5
Carleton	97	.....	75	..	33	29	10	7	11
Dufferin	15	......	11	.....	1	10	4	1	1
Elgin	57	..	43	....	8	20	9	3	7
Essex	64	......	52	......	18	15	14	6	17
Frontenac	36	......	24	......	2	9	2	......	2
Grey	32	......	22	......	10	5	7	2	4
Haldimand	10	......	8	.....	1	9	3	2	2
Halton	12	....	8	......	5	7	...	1	2
Hastings	64	......	52	....	22	20	14	9	5
Huron	46	......	38	2	17	12	5	5	8
Kent	49	.....	37	.....	10	14	19	4	6
Lambton	32	......	29	......	11	13	12	7	3
Lanark	18	......	10	......	3	10	8	1	3
Leeds and Grenville	39	......	33	......	....	4	8	2	3
Lennox and Addington	7	....	4	......	2	3	....	1	....
Lincoln	48	.....	36	1	3	10	3	1	4
Manitoulin	9	.....	6	1	9	4	...	......	1
Middlesex	146	1	102	....	27	58	21	12	7
Muskoka	12	.....	11	......	5	7	2	4	2
Nipissing	18	......	9	......	3	7	3	3	3
Norfolk	18	....	11	......	3	7	1	1	....
Northumberland and Durham	23	.....	12	......	9	20	4	1	3
Ontario	31	......	26	...	1	21	1	......	....
Oxford	49	.....	36	3	7	38	6	5	3
Parry Sound	6	......	5	......	......	1	....	......	2
Peel	19	......	17	....	7	24	4	4	2
Perth	29	......	26	......	13	13	7	6	2
Peterborough	49	......	39	....	8	4	3	1	3
Prescott and Russell	5	......	3	......	2	4	1	......	....
Prince Edward	21	......	19	......	12	14	9	5	1
Rainy River	50	......	50	.....	7	51	10	......	5
Renfrew	30	......	29	.. .	....	20	.....	....	1
Simcoe	52	.....	23	2	16	....	11	5	4
Stormont, Dundas and Glengarry	54	......	51	.....	11	21	......	3	....
Thunder Bay	27	......	26	......	9	46	5	....	8
Victoria	22	...	22	.....	5	8	6	5	2
Waterloo	44	......	33	......	4	20	4	2	2
Welland	15	.....	14	......	9	8	4	1	4
Wellington	43	....	30	.....	8	26	......	1	1
Wentworth	129	......	115	2	47	49	19	20	9
York	613	3	456	1	186	367	34	38	67
Totals	2,266	4	1,751	18	583	1,079	292	179	221

throughout the Province of Ontario during the year ending 31st December, 1897.

Number of Judgments entered without trial.	(a) Total amount of such Judgments without costs.	(b) Total amount of Costs taxed thereunder.	(c) Total amount of Disbursements allowed.	Number of Judgments entered after trial.	(a) Total amount of such Judgments without costs.	(b) Total amount of Costs taxed thereunder.	(c) Total amount of Disbursements allowed.	Total number of Judgments.	Number of Writs of Execution issued against goods and lands.	Number of Writs of Ca. Sa. issued.
	$ c.	$ c.	$ c.		$ c.	$ c.	$ c.			
13	2,731 83	252 18	61 71	3	......	213 80	76 08	16	8	......
14	3,079 99	222 67	89 30	2	282 00	70 20	17 30	16	19	......
19	4,978 08	384 47	110 75	3	315 52	821 16	434 33	23	18	......
48	13,113 26	930 04	268 24	6	1,281 81	443 17	210 51	54	63	......
4	1,847 69	52 00	21 21	......	......	......	......	4	3	......
14	3,501 28	227 62	74 01	8	854 71	420 56	99 41	22	14	......
15	3,456 53	232 99	75 49	7	478 06	1,233 15	696 74	22	......	......
16	3,728 77	213 76	58 45	......	......	......	......	16	12	......
8	1,782 62	111 07	34 09	2	509 10	279 93	101 87	10	8	......
6	1,672 37	117 24	31 26	......	......	......	......	6	5	......
4	957 77	45 35	22 13	2	191 27	111 95	173 41	6	1	......
20	6,423 82	325 16	85 22	13	1,463 94	872 53	197 07	33	19	......
14	3,308 74	272 54	80 52	4	932 40	383 86	195 01	18	14	......
17	4,701 52	331 59	95 82	4	772 19	172 59	94 20	22	10	......
8	2,308 99	126 79	30 62	1	......	227 83	82 96	9	5	......
6	1,038 74	96 16	25 42	......	......	......	......	4	4	......
13	3,577 72	224 88	63 46	9	1,668 83	566 89	250 87	22	14	......
3	656 84	43 73	11 60	1	329 38	122 06	60 15	4	3	......
23	7,386 59	415 08	144 49	3	360 50	222 19	77 84	26	19	1
1	410 66	29 31	4 37	2	497 25	527 33	73 12	3	6	......
60	14,091 31	1,121 74	297 95	7	1,390 16	521 82	160 32	67	86	......
3	609 04	91 73	39 53	1	......	32 73	17 98	3	5	......
7	1,786 57	116 22	39 37	3	310 10	363 54	197 94	7	......	......
5	1,783 50	97 25	23 63	......	......	......	......	5	3	......
9	1,653 83	85 07	21 90	......	......	......	......	9	10	......
14	4,072 71	203 92	101 30	......	......	......	......	14	14	......
18	4,474 65	395 23	113 15	5	330 86	585 53	245 81	23	14	......
3	575 00	28 29	......	1	259 18	44 02	......	3	3	......
9	2,536 28	216 01	154 19	1	359 00	94 08	42 51	10	7	......
11	3,668 78	252 99	62 14	3	510 35	422 61	240 57	14	9	......
17	3,888 33	278 86	63 87	4	119 83	364 57	166 85	21	19	......
2	555 41	34 85	8 43	......	......	......	......	2	2	......
9	2,530 57	263 49	98 87	5	488 18	563 18	207 54	10	1	......
27	17,995 16	667 95	145 88	......	......	......	......	27	24	......
18	4,991 36	345 93	125 54	1	150 00	40 39	17 44	19	12	......
18	4,583 70	319 78	91 95	7	753 11	513 00	238 10	31	17	......
38	8,842 27	833 21	274 31	1	128 00	55 12	8 78	39	27	......
6	7,368 20	132 06	33 01	5	1,401 45	387 91	142 51	9	17	......
13	4,076 00	353 00	106 00	2	85 00	199 00	132 00	15	10	......
18	5,435 36	356 99	98 62	2	707 34	288 84	103 42	20	17	......
4	937 04	50 67	21 43	3	234 69	130 25	33 95	7	4	......
18	5,371 91	280 99	80 29	2	421 52	137 89	86 42	20	13	......
55	14,333 38	974 98	280 22	9	603 50	637 23	341 99	64	55	......
252	66,417 47	4,306 67	956 47	54	6,580 38	5,274 91	1,570 05	306	275	......
900	253,191 55	16,492 51	4,626 21	186	24,769 61	17,345 82	6,795 15	1,081	889	1

APPENDIX D.—Being a return of business transacted by County Court Clerks throughout

Counties or districts.	Number of Certificates under Creditor's Relief Act.	Amount for which issued, without costs.	Amount of costs allowed thereunder.	Amount of money paid into Court with defence.	Number of day's sitting of Judge with Jury.	Number of day's sitting of Judge without Jury.	Number of days of sitting of County Court.	Amount of Jury Fees paid to County Treasurer.	Number of Partition Matters.	Amount of money paid thereunder.
		$ c.	$ c.	$ c.				$ c.		$ c.
Algoma	....	....	......	....	....	....	6	3 00	....	235 82
Brant	....	....	......	....	....	9	9	7 50	....	....
Bruce	21	5,482 95	44 30	....	2	6	8	3 00	....	....
Carleton	....	....	......	234 49	14	6	20	9 00	....	....
Dufferin	....	....	......	....	2	1	3	1 50	....	....
Elgin	....	....	......	50 00	5	7	12	3 00	....	....
Essex	....	....	...	245 00	....	....	23	12 00	1	875 00
Frontenac	....	....	......	....	....	....	3	......	....	....
Grey	1	202 45	7 25	....	....	....	6	3 00	....	....
Haldimand	....	....	......	....	2	2	4	3 00	....	....
Halton	....	....	......	....	1	2	3	......	....	....
Hastings	5	2,120 67	26 95	58 33	....	....	16	13 50	....	....
Huron	....	....	......	....	7	3	10	4 50	2	....
Kent	....	....	......	121 42	....	....	10	6 00	..	....
Lambton	....	....	......	....	....	....	10	10 50	....	....
Lanark	....	....	......	....	....	....	3	......	....	....
Leeds and Grenville	4	12,330 98	63 69	....	4	4	8	3 00	...	....
Lennox and Addington	....	....	......	....	....	....	4	1 50	....	....
Lincoln	....	....	......	304 00	....	....	7	1 50	....	....
Manitoulin	....	....	......	....	....	2	2	......	....	....
Middlesex	....	....	......	....	15	1	16	18 00	....	....
Muskoka	....	....	......	176 00	....	....	4	3 00	....	....
Nipissing	....	....	......	....	5	3	8	4 50	....	....
Norfolk	....	....	......	....	1	....	1	1 50	....	....
Northumberland and Durham	....	....	......	....	....	..	7	1 50	....	....
Ontario	....	....	......	....	....	2	2	......	....	....
Oxford	....	....	......	....	5	2	7	7 50	....	....
Parry Sound	....	....	......	....	....	....	2		....	....
Peel	1	922 00	4 00	....	5	1	6	6 00	....	....
Perth	....	....	......	....	4	3	7	7 50	....	....
Peterborough	....	....	......	309 53	1	3	4	1 50	....	....
Prescott and Russell	....	....		....	....	....	2		....	....
Prince Edward	4	407 56	24 48	274 75	6	1	7	7 50	....	....
Rainy River	....	....	......	....	....	2	2	......	.	....
Renfrew	....	....		....	....	....	1	......	...	....
Simcoe	1	67 92	....	....	..	....	6	7 50	....	....
Stormont, Dundas and Glengarry	....	....	......	100 00	7		7	4 50	....	....
Thunder Bay	....	....	......	....	.	10	10	...	....	....
Victoria	....	....	......	....	8	2	10	6 00		....
Waterloo	..	....	......	....	3	1	4	..	5	1,084 24
Welland	....	....	......	....	3	3	6	1 50	....	....
Wellington	....	....	...	....	..	....	3	1 50	....	....
Wentworth	2	465 10	26 56	....	10	8	18	30 00	.	....
York	....	....	.....	410 96	....	....	91	57 00	....	....
Totals	39	21,999 63	197 23	2,284 48	110	84	398	252 00	8	2,195 06

the Province of Ontario during the year ending 31st December, 1897.—*Concluded.*

Amount paid out.	Amount at joint credit of Judge and Clerk, including interest allowed.	Number of Chattel Mortgages and Bills of Sale filed.	Total amount secured by such Mortgages.	Number of Mortgages renewed.	Number of Discharges filed.	Number of Assignments filed under R.S.O., Cap. 124.	Number of Hire Receipts filed under 57 Vict., Cap. 19.	Total amount secured by such receipts.	Amount of fees earned by Clerk of the Courts, not including salary paid.
$ c.	$ c.		$ c.					$ c.	$ c.
235 82	......	214	545,792 97	52	2	18	61	9,142 77	247 23
......	1,921 27	270	133,152 08	154	8	8	85	6,151 73	456 00
853 88	3,857 57	594	158,500 00	372	9	24	81	12,925 14	1,095 90
......	......	396	298,682 97	340	28	40	57	51,402 64	1,096 25
......	......	221	70,001 36	135	3	10	37	4,531 57	288 65
......	307 90	462	187,282 43	162	5	11	249	17,174 78	574 12
875 00	624 83	454	118,465 97	185	14	18	96	13,808 74	672 35
......	344 41	523	181,825 66	228	5	10	106	5,262 40	467 40
......	......	1,251	359.018 79	483	4	12	93	8,428 44	699 20
......	......	128	37,911 93	56	1	1	13	2,106 15	219 80
......	......	107	46,512 44	45	6	4	13	3,410 00	155 30
......	1,188 27	949	204,345 57	330	13	23	249	8,298 24	1,053 05
249 36	3,681 02	337	131,525 29	185	11	29	79	8,523 27	467 85
......	......	800	208,116 31	392	11	18	823	31,689 10	763 40
......	......	412	181,580 45	221	10	20	72	12,105 85	617 75
......	......	156	99,756 72	86	2	...	8	1,501 00	302 10
......	......	364	96,164 23	181	13	30	25	3,213 45	712 01
......	......	165	47,115 88	149	4	9	57	1,717 50	267 15
......	......	198	94,709 19	156	4	16	45	8,363 40	503 56
......	......	95	68,297 72	26	2	8	15	959 52	114 58
......	......	479	147,532 42	378	8	31	190	25,941 85	1,064 35
......	......	......	......	......	......	......	29	5,456 81	66 18
......	......	235	579,363 31	52	3	23	7	1,002 30	233 45
1,343 62	484 82	242	34,142 99	103	8	7	141	12,511 39	396 50
......	......	452	120,321 16	378	9	16	77	11,104 99	725 41
......	......	294	161,312 01	204	2	19	80	6,507 46	495 60
......	......	228	100,166 68	148	14	23	51	8,446 07	693 80
......	......	......	......	......	......	......	......	......	21 30
......	51 43	152	86,309 86	108	5	16	12	1,056 50	364 37
......	......	175	161,368 28	124	7	20	22	2,281 19	480 65
......	......	385	681,753 72	162	1	8	37	5,871 25	392 35
......	......	202	87,277 33	38	2	3	57	3,569 95	201 53
......	......	154	37,000 78	97	3	9	8	1,311 50	473 62
......	......	......	......	......	......	......	......	......	182 60
......	......	242	67,617 64	132	6	25	22	2,385 50	425 33
......	......	595	338,630 36	374	11	24	136	14,124 86	876 77
......	......	245	143,827 27	145	14	16	147	8,741 21	660 95
......	......	43	10,160 81	18	5	1	38	6,720 40	280 20
......	......	398	615,485 00	172	4	8	71	5,314 00	319 90
......	1,116 82	317	197,460 65	100	12	23	76	12,364 24	414 07
......	174 16	315	151,179 88	73	8	10	46	2,188 00	323 90
689 64	4,674 66	537	262,655 96	183	8	23	21	2,838 79	556 10
......	......	413	146,552 87	357	21	29	113	23,139 24	1,322 43
......	......	1,832	985,080 00	984	59	119	560	116,931 00	4,717 80
4,247 32	18,427 16	16,031	8,383,956 94	8,268	365	762	4,205	490,524 19	26,463 71

Appendix E.—Being a return of business transacted by Surrogate Registrars

Counties or districts.	Total number of Probates issued.	Total number of Letters of Administration issued.	Total number of Letters of Guardianship issued.	Total number of Probates and Letters of Administration issued under 57 Vict., cap. 22.	Total number of Probates and Letters issued under R. S. O. 1887, c. 50, s. 67, as amended by 53 Vict., c. 17, s. 17, and included in above.	Number of Wills proved or Guardianship issued as fol-			
						Above $100,000.	From $50,000 to $100,000.	From $25,000 to $50,000.	From $10,000 to $25,000.
Algoma	2	4	....	....	1	......	......	......	......
Brant	63	35	4	19	9	1	1	2	1
Bruce	154	52	2	28	23	......	1	......	1
Carleton	113	67	5	33	23	......	......	4	11
Dufferin	24	13	6	8	3	......	......	......	......
Elgin	72	39	9	20	20	......	......	1	2
Essex	37	38	6	11	24	......	......	......	3
Frontenac	48	26	4	9	9	......	......	3	1
Grey	106	35	2	27	16	......	......	......	4
Haldimand	52	24	4	7	12	......	......	......	4
Halton	29	16	1	7	6	......	......	1	......
Hastings	74	38	7	17	17	1	......	1	2
Huron	126	63	4	22	16	......	......	1	6
Kent	84	22	5	16	23	......	......	......	3
Lambton	90	45	3	19	17	......	......	2	3
Lanark	41	23	3	8	8	......	......	2	4
Leeds and Grenville	91	28	6	9	8	......	......	......	4
Lennox and Addington	33	15	1	6	7	......	......	2	2
Lincoln	48	34	....	15	11	......	......	......	3
Manitoulin	4	8	....	2	2	......	......	......	......
Middlesex	180	76	9	35	39	1	1	3	7
Muskoka	10	7	....	1	....	......	......	......	......
Nipissing	4	8	2	1	4	......	......	......	......
Norfolk	50	23	6	14	11	......	......	......	2

throughout the Province of Ontario during the year ending 31st December, 1897.

and Letters of Administration where personalty valued lows :—				Total amount of personalty devolving.	Total amount of Realty to be administered under R. S. O. 1887, cap. 108, s. 4.	Amount of fees collected by Surrogate Registrar for—		
From $5,000 to $10,000.	From $1,000 to $5,000.	From $400 to $1,000.	$400 and under.			Registrar's fees.	Judge's fees.	Fee fund.
				$ c.	$ c.	$ c.	$ c.	$ c.
......	1	4	1	3,850 00	....	41 65	22 75	12 00
6	35	20	36	365,989 26	299,560 00	875 28	568 75	331 00
4	50	41	57	239,970 00	246,416 00	1,382 43	660 60	358 50
9	60	44	57	550,758 70	86,721 77	1,604 79	808 00	595 20
2	6	17	18	41,921 66	4,700 00	337 00	122 70	86 00
7	23	26	41	186,254 70	173,502 00	984 11	482 50	267 50
2	23	15	24	118,488 60	173,838 50	590 93	319 25	175 00
2	37	18	19	235,416 97	133,826 00	711 53	390 75	212 50
2	39	47	51	190,138 01	55,175 00	1,107 40	584 35	318 50
2	29	12	33	121,438 21	150,535 00	739 00	385 15	182 00
4	16	7	13	128,372 89	123,552 80	436 04	288 75	137 00
4	31	32	41	291,175 47	15,571 00	969 34	498 10	310 00
12	74	43	57	396,230 79	62,270 00	1,914 75	1,054 75	507 50
11	38	27	49	147,865 48	259,526 00	977 26	462 55	321 50
5	46	34	38	281,437 50	236,112 50	964 92	513 25	355 50
3	23	17	18	168,088 00	119,873 00	542 51	288 00	190 50
4	43	35	33	234,491 48	32,868 00	1,077 19	470 00	807 00
1	16	12	16	150,819 76	79,835 00	507 52	345 10	150 00
3	26	26	24	140,021 59	153,858 00	634 47	292 60	215 50
1	2	3	6	14,289 03	11,890 00	75 78	41 00	25 00
14	87	52	100	786,618 51	79,163 00	2,130 70	1,294 40	774 00
......	6	1	10	17,355 55	6,825 00	101 75	36 25	32 00
..	5	1	8	11,432 98	9,099 00	88 40	40 25	27 00
3	24	18	33	103,829 61	64,810 00	757 05	299 25	163 50

APPENDIX E.—Being a return of business transacted by Surrogate Registrars through-

Counties or districts.	Total number of Probates issued.	Total number of Letters of Administration issued.	Total number of Letters of Guardianship issued.	Total number of Probates and Letters of Administration issued under 57 Vict., cap. 22.	Total number of Probates and Letters issued under R. S. O. 1887, c. 50, s. 67, as amended by 53 Vict., c. 17, s. 17, and included in above.	Number of Wills proved or Guardianship issued as fol-			
						Above $100,000.	From $50,000 to $100,000.	From $25,000 to $50,000.	From $10,000 to $25,000.
Northumberland and Durham	102	49	7	28	20	.....	......	3	4
Ontario	86	37	6	14	14	......	.. ...	......	1
Oxford	101	44	2	18	17	......	.....	1	17
Parry Sound	10	6	1	8	4	......	.....	......	.....
Peel	55	24	2	13	12	......	......	......	1
Perth	85	39	3	19	15	1	... ..	1	3
Peterborough	44	23	1	10	13	......	......	3	1
Prescott and Russell	35	11	3	7	4	......	.... .	......	3
Prince Edward	25	8	....	4	5	......	1	... .	......
Rainy River	3	7	....	....	3	......	......	....	......
Renfrew	36	18	1	9	9	1	......	... .	1
Simcoe	102	51	7	25	21	....	2	1	......
Stormont, Dundas and Glengarry	63	28	7	19	9	1	......	1	5
Thunder Bay	4	10	2	....	6	......	......	......	......
Victoria	31	26	2	5	7	......	.... .	. . .	1
Waterloo	119	36	5	30	16	......	1	5	7
Welland	54	31	2	15	5	......	......	......	3
Wellington	109	58	12	22	33	......	1	1	5
Wentworth	117	74	15	30	40	1	......	1	10
York	325	227	19	81	108	3	7	10	28
Totals	3,041	1,546	186	691	670	10	15	49	153

out the Province of Ontario during the year ending 31st December, 1897.—*Concluded.*

and Letters of Administration where personalty valued lows :—				Total amount of personalty devolving.	Total amount of Realty to be administered under R. S. O. 1887, cap. 108, s. 4.	Amount of fees collected by Surrogate Registrar for—		
From $5,000 to $10,000.	From $1,000 to $5,000.	From $400 to $1,000.	$400 and under.			Registrar's fees.	Judge's fees.	Fee fund.
				$ c.	$ c.	$ c.	$ c.	$ c.
9	55	38	49	367,463 52	204,734 00	1,237 02	685 75	448 50
9	41	40	38	169,950 47	42,868 33	1,008 60	606 50	293 50
36	45	25	23	314,724 89	377,930 82	1,589 35	734 25	397 50
......	1	8	4	11,014 41	12,025 00	77 24	28 00	28 50
6	31	17	26	145,981 19	189,780 00	732 38	421 75	194 00
8	41	30	43	406,665 03	228,820 00	1,184 20	775 00	416 00
3	20	13	27	182,687 08	112,476 00	475 83	294 00	187 00
3	3	33	7	110,921 72	46,463 87	368 51	161 50	113 00
......	11	8	13	132,590 90	93,425 00	350 27	180 75	118 50
1	4	2	3	14,665 55	13,129 00	70 49	34 00	27 00
4	15	13	20	313,381 13	87,480 00	413 19	381 25	233 00
4	45	37	47	328,312 94	207,341 31	1.315 77	669 20	435 50
7	30	26	28	379,987 46	670 00	893 64	500 75	360 00
2	7	1	6	19,578 17	....	108 95	48 00	29 50
1	23	15	18	86,106 00	97,866 00	441 67	186 45	118 55
17	47	33	50	639,041 40	260,005 51	1,074 39	914 25	591 50
6	33	17	28	96,912 50	111,164 00	872 20	415 00	229 50
9	39	60	64	376,375 00	394,385 00	1,468 76	888 00	445 50
11	61	45	77	565,596 95	486,344 00	1,746 59	1,036 25	578 54
32	175	111	205	5,015,543 00	....	4,508 97	2,975 75	3,338 50
269	1,467	1,124	1,559	14,603,784 06	5,546,435 41	39,489 82	22,205 45	15,147 79

APPENDIX F.—Return of fees and emoluments of County Judicial Officers in the

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c.	$ c.
Algoma	Sault Ste. Marie.	Sheriff	W. H. Carney.......	2,175 89	1,000 00
		Surrogate Judge	Judge Johnston	22 75	....
		Local Master	"	56 25	....
		District Crown Attorney..	J. J. Kehoe	487 85	....
		Clerk of the Peace........	"	527 05	400 00
		Local Registrar, *pro tem.*	T. H. Murray.......	90 50	150 00
		District Court Clerk, "	"	247 23	600 00
		Surrogate Registrar, "	"	41 65	....
Brant	Brantford	Sheriff	Wm. Watt, jr.	2,097 20	....
		Surrogate Judge	Judge Jones	commuted	588 00
		Local Master	"	commuted	577 00
		Crown Attorney	G.R. VanNorman, Q.C	404 55	....
		Clerk of the Peace........	"	686 50	....
		Local Registrar...........	Walter Rubidge	118 00	675 00
		County Court Clerk.......	"	456 00	....
		Surrogate Registrar	"	875 28	....
Bruce	Walkerton	Sheriff	F. S. O'Connor	3,009 58	....
		Surrogate Judge	Judge Barrett	660 60	....
		Local Master	W. A. McLean......	commuted	850 00
		Local Registrar	"	commuted	450 00
		Crown Attorney..........	Thos. Dixon	581 90	....
		Clerk of the Peace.	"	1,342 73	....
		County Court Clerk	M. Goetz	1,095 90	....
		Surrogate Registrar.......	"	1,382 43	....
Carleton	Ottawa.........	Sheriff	John Sweetland	4,551 04	....
		Surrogate Judge..........	Judge Ross	commuted	500 00
		"	Judge Mosgrove.....	commuted	500 00
		Local Masters	R. Cassels, Q.C......	....	....
			W. L. Scott	2,661 80	....
		Deputy Registrar	"	594 65	....

Province of Ontario, earned and received during the year ending 31st Dec., 1897.

Total earnings and salary in each office.	Tota' earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
3,175 89	3,175 89	2,941 71	154 41	3,096 12	1,328 13	1,767 99	....	1,767 99
22 75	79 00	22 75	....	29 75	....	29 75	....	29 75
56 25	....	7 00	....	....	....	....	....	....
487 85	1,414 90	308 00	64 00	1,132 41	37 75	1,094 66	....	1,094 66
927 05	....	695 91	64 50	....	....	....	....	....
240 50	1,129 38	1,129 38	....	1,129 38	40 00	1,089 38	....	1,089 38
847 23	....	....	....	....	....	....	....	....
41 65	....	....	....	....	....	....	....	....
....	2,097 20	1,880 23	145 84	2,026,07	422 47	1,603 60	....	1,603 60
588 00	1,165 00	....	....	1,165 00	....	1,165 00	....	1,165 00
577 00	....	....	....	....	....	....	....	....
404 55	1,091 05	404 55	....	1,091 05	....	1,091 05	....	1,091 05
686 50	....	686 50	....	....	....	....	....	....
793 00	2,124 28	793 00	....	2,112 28	825 50	1,286 78	....	1,286 78
456 00	....	456 00	....	....	....	....	....	....
875 28	....	863 28	....	....	....	....	....	....
3,009 58	3,009 58	2,306 34	661 53	2,967 87	995 18	1,972 69	....	1,972 69
....	660 60	....	....	660 60	....	660 60	....	660 60
....	1,300 00	....	....	1,300 00	....	1,300 00	....	1,300 00
....	....	....	....	....	....	....	....	....
581 90	1,924 63	434 50	204 70	2,177 69	101 14	2,076 55	7 65	2,068 90
1,342 73	....	926 78	611 71	....	....	....	....	....
1,095 90	2,478 33	920 10	136 57	2,161 62	339 00	1,822 62	32 26	1,790 36
1,382 43	....	938 23	166 72	....	....	....	....	....
4,551 04	4,551 04	3,783 04	589 23	4,372 27	2,070 34	2,301 93	30 19	2,271 74
....	500 00	....	....	500 00	....	500 00	....	500 00
....	500 00	....	....	500 00	....	500 00	....	500 00
....	....	....	....	....	....	....	....	....
2,661 80	3,256 45	2,470 22	2 60	3,051 26	211 52	2,839 74	....	2,839 74
594 65	....	578 44	....	....	....	....	....	....

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c.	$ c.
Carleton.—*Con*..	Ottawa.........	Crown Attorney	J. A. Ritchie........	802 00	....
		Clerk of the Peace........	"	1,060 78	....
		Deputy Clerk of the Crown	J. P. Featherston. ..	870 60	450 00
		County Court Clerk.......	"	1,096 25	....
		Surrogate Registrar.	"	1,604 79	.. ..
Dufferin........	Orangeville.....	Sheriff	T. Bowles	2,248 02	....
		Surrogate Judge..........	Judge McCarthy	commuted	168 00
		Local Master	" ...	102 54	....
		Crown Attorney..........	W. J. L. McKay	338 25	....
		Clerk of the Peace........	"	458 19	....
		Local Registrar...........	John McLaren	84 60	675 00
		County Court Clerk	"	288 65	.. ..
		Surrogate Registrar	"	337 00	....
Elgin	St. Thomas.....	Sheriff	Dugald Brown	2,111 67	....
		Surrogate Judge..........	Judge Hughes	482 50	....
		Local Master	Robert Miller	1,032 77	....
		Crown Attorney..........	D. J. Donahue	981 19	....
		Clerk of the Peace........	"	884 79	....
		Local Registrar	D. McLaws	463 50	675 00
		County Court Clerk	"	574 12	....
		Surrogate Registrar.......	"	984 11	....
Essex	Sandwich	Sheriff	J. C. Iler...........	3,058 47	....
		Surrogate Judge..........	Judge Horne	319 25	....
		Local Master.............	J. F. Hare	203 00	.....
		Deputy Registrar	"	96 30	....
		Crown Attorney	A. H. Clarke..... ..	768 56	....
		Clerk of the Peace........	"	779 66	....
		Deputy Clerk of Crown...	F. E. Marcon........	291 00	450 00
		County Court Clerk.......	"	672 35	....
		Surrogate Registrar	"	590 93	....

Judicial Officers in the Province of Ontario, etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
802 00	1,862 78	427 00	65 00	1.855 25	610 57	1,244 68	....	1,244 68
1,060 78	....	601 47	761 78	....	....	....	....	....
1.320 60	4,021 64	1,229 47	135 70	4.119 66	1,168 36	2,951 30	285 39	2,665 91
1,096 25	....	1,073 85	22 35	....	....	....	....	....
1,604 79	....	1,561 64	96 65	....	....	....	....	....
2,248 02	2,248 02	1,659 35	542 74	2,202 09	739 00	1,463 09	....	1,463 09
168 00	270 54	168 00	....	248 45	....	248 45	....	248 45
102 54	....	80 45	....	....	....	....	....	....
338 25	796 44	309 95	138 70	907 34	115 00	792 34	....	792 34
458 19	....	266 59	192 10	....	....	....	....	....
759 60	1,385 25	759 60	....	1.386 80	16 60	1,370 20	....	1,370 20
288 65	....	276 95	7 85	....	....	....	....	....
337 00	....	337 00	5 40	....	....	....	....	....
2,111 67	2,111 67	1,406 72	743 08	2,149 80	976 72	1,173 08	....	1,173 08
....	482 50	....	....	482 50	....	482 50	....	482 50
....	1,032 77	637 47	558 99	1,196 46	150 00	1.046 46	....	1,046 46
981 19	1,865 98	685 05	186 05	1.487 56	271 11	1,216 45	....	1,216 45
884 79	....	513 52	102 94	....	....	....	....	....
1 138 50	2,696 73	973 71	49 70	2,457 70	357 50	2,100 20	70 04	2,030 10
574 12	....	505 92	67 43	....	....	....	....	....
984 11	....	791 79	69 15	....	....	....	....	....
....	3,058 47	2,658 47	608 99	3,267 46	1,600 00	1,667 46	....	1,667 46
....	319 25	....	....	319 25	....	319 25	....	319 2
203 00	299 30	174 30	....	270 60	35 00	235 60	....	235 60
96 30	....	96 30	....	....	....	....	....	....
768 56	1,548 22	567 89	192 54	1,572 11	600 00	972 11	....	972 11
779 66	....	494 67	317 01	....	....	....	....	....
741 00	2,004 28	741 00	....	2,004 28	260 00	1,744 28	24 43	1,719 85
672 35	....	672 35	....	....	....	....	....	....
590 93	....	590 93	....	....	....	....	....	....

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salaries paid by Government.
				$ c.	$ c.
Frontenac......	Kingston......	Sheriff	William Ferguson...	2,124 16	....
		Surrogate Judge.......	Judge Price.........	commuted	752 00
		Local Master	J. M. Machar, Q.C...	375 95	....
		Crown Attorney........	J. L. Whiting, Q.C..	273 00	.. ..
		Clerk of the Peace......	“ ..	888 00	....
		Local Registrar	Archibald McGill....	128 10	675 00
		County Court Clerk	“	467 40	....
		Surrogate Registrar....	“	711 53	....
Grey	Owen Sound ...	Sheriff	C. H. Moore	2,907 68	....
		Surrogate Judge.......	Judge Creasor.......	584 35	....
		Local Masters........	“ .... Judge Morrison....	338 33	....
		Crown Attorney........	A. G. MacKay	531 52	....
		Clerk of the Peace......	Wm. Armstrong	900 75	....
		Local Registrar...... ..	G. Inglis...........	155 50	750 00
		County Court Clerk.....	“	699 20	....
		Surrogate Registrar.....	“	1,107 40	....
Haldimand	Cayuga	Sheriff	R. H. Davis..	1,321 84	100 00
		Surrogate Judge	Judge McMillan.....	385 15	....
		Local Master..........	“	110 25	....
		Crown Attorney.	C. W. Colter	520 36	....
		Clerk of the Peace......	“	1,190 08	. ...
		Local Registrar.........	James Mitchell	137 80	600 00
		County Court Clerk	“	219 80	....
		Surrogate Registrar	“	739 00	....
Halton	Milton	Sheriff	M. Clements	1,268 06	....
		Surrogate Judge	Judge Hamilton.....	288 75	....
		Local Master	“	35 50	....
		Crown Attorney........	T. G. Matheson	475 60	....
		Clerk of the Peace......	“	1,383 78	....

Judicial Officers in the Province of Ontario, etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
....	2,124 16	2,124 16	....	2,124 16	745 48	1,378 68	....	1,378 68
....	752 00	....	....	752 00	....	752 00	....	752 00
....	375 95	213 46	286 38	499 84	100 00	399 84	....	399 84
273 00	1,161 00	146 00	149 00	1,172 55	30 00	1,142 55	....	1,142 55
888 00	....	493 80	383 75	....	....	....	....	....
803 10	1,982 03	756 88	12 47	1,779 42	655 00	1,124 42	....	1,124 42
467 40	....	421 17	12 45	....	....	....	....	....
711 53	....	526 65	49 80	....	....	....	....	....
2,907 68	2,907 68	2,188 05	991 50	3,179 55	1,151 20	2,028 35	2 84	2,025 51
584 35	584 35	....	....	584 35	....	584 35	....	584 35
338 33	338 33	270 59	83 51	354 10	....	354 10	....	354 10
531 52	531 52	363 37	334 20	697 57	52 97	644 60	....	644 60
900 75	900 75	900 75	....	900 75	420 00	480 75	....	480 75
905 50	2,712 10	874 50	....	2,641 95	325 45	2,316 50	113 30	2,203 20
699 20	....	685 30	....	....	....	....	....	....
1,107 40	....	1,035 60	46 55	....	....	....	....	....
1,421 84	1,421 84	1,421 84	54 12	1,475 96	198 38	1,277 58	....	1,277 58
385 15	495 40	385 15	....	509 40	....	509 40	....	509 40
110 25	....	110 25	14 00	....	....	....	....	....
520 36	1,710 44	257 78	68 54	1,437 67	337 00	1,100 67	....	1,100 67
1,190 08	....	743 27	368 08	....	....	....	....	....
737 80	1,696 60	737 80	....	1,696 60	45 00	1,651 60	15 16	1,636 44
219 80	....	219 80	....	....	....	....	....	....
739 00	....	739 00	....	....	....	....	....	....
....	1,268 06	1,151 83	105 37	1,257 20	396 20	861 00	....	861 00
288 75	324 25	288 75	....	288 75	1 00	287 75	....	....
35 50	....	35 50	....	....	....	....	....	....
475 60	1,859 38	440 60	160 45	1,974 15	108 16	1,865 99	....	1,865 99
1,383 78	....	920 04	453 05	....	....	....	....	....

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salaries paid by Government.
				$ c.	$ c
Halton.—*Con*...	Milton	Local Registrar	W. A. Lawrence.....	29 30	600 00
		County Court Clerk.....	"	155 30	....
		Surrogate Registrar.....	"	436 04	
Hastings	Belleville.......	Sheriff	G. Hope	3,240 83	....
		Surrogate Judge........	Judge Lazier........	commuted	500 00
		Local Master and Deputy Registrar	S. S. Lazier	commuted	3,000 00
		Crown Attorney........	P. J. M. Anderson ..	1,637 65	....
		Clerk of the Peace	" ..	1,422 14	....
		Deputy Clerk of the Crown	A. G. Northrup	251 53	450 00
		County Court Clerk	"	1,053 04	....
		Surrogate Registrar.. ..	"	969 34	....
Huron	Goderich	Sheriff	R. G. Reynolds......	2,661 61	....
		Surrogate Judge	Judge Masson......	1,000 00	....
		*Local Master..........	Judge Doyle	83 95	....
		Crown Attorney	Ira Lewis	613 55	... .
		Clerk of the Peace.....	"	1,301 49	. ...
		Local Registrar.........	D. McDonald	335 90	619 56
		County Court Clerk.....	"	467 85	....
		Surrogate Registrar.....	"	1,914 75	....
Kent......	Chatham	†Sherff	J. R. Gemmill	2,933 22	....
		Surrogate Judge........	Judge Bell	commuted	450 00
		Local Master and Deputy Registrar	R. O'Hara...........	commuted	1,600 00
		Crown Attorney	Wm. Douglas, Q.C...	1,203 03	....
		Clerk of the Peace......	" ..	1,439 70	....
		Deputy Clerk of the Crown	W. A. Campbell.....	150 00	450 00
		County Court Clerk ...	"	763 40	....
		Surrogate Registrar.....	"	977 26	....

*Appointed 12th September, 1897. Appointed 15th March, 1897.

Judicial Officers in the Province of Ontario, etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
629 30	1,220 64	629 30	....	1,220 64	300 00	920 64	.....	920 64
155 30	....	155 30	....	....	....	....	....	....
436 04	....	436 04	....	....	....	....	....	....
....	3,240 83	2,396 09	666 55	3,062 64	799 92	2,262 72	26 27	2,236 45
....	500 00	....	....	500 00	....	500 00	....	500 00
....	3,000 00	....	....	3.000 00	650 00	2,350 00	....	2.350 00
1.637 65	3,059 79	1,338 65	372 20	3,210 49	418 83	2,791 66	108 33	2,683 33
1,422 14	....	935 74	563 90	....	....	....	....	....
701 53	2,723 91	600 00	204 24	2,769 24	872 63	1,896 61	39 66	1,856 95
1,053 04	....	680 00	352 88	....	....	....	....	....
969 34	....	603 00	329 12	....	....	....	....	....
....	2,661 61	2,276 68	....	2,276 68	702 23	1,574 45	....	1,574 45
....	1.000 00	....	....	1,000 00	....	1,000 00	....	1,000 00
....	83 95	....	....	83 95	....	83 95	....	83 85
613 55	1,915 04	422 20	276 00	2,026 14	768 85	1,257 29	....	1,257 29
1,301 49	....	1,217 24	110 70	....	....	....	....	....
955 46	3,338 06	955 46	....	3,338 06	642 21	2,695 85	208 75	2,487 10
467 85	....	467 85	....	....	....	....	....	....
1,914 75	....	1,914 75	....	....	....	....	....	....
....	2,933 22	2,228 04	709 67	2,937 71	969 07	1,968 64	....	1,968 64
....	450 00	....	....	450 00	....	450 00	....	450 00
....	1,600 00	....	....	1,600 00	....	1,600 00	....	1,600 00
1,203 03	2,642 73	858 03	245 25	2,482 98	530 00	1,952 98	....	1,952 98
1,439 70	....	1,059 85	319 85	....	....	....	....	....
600 00	2,340 66	600 00	....	2,340 66	750 00	1,590 66	9 06	1,581 60
763 40	....	763 40	....	....	....	....	....	....
977 26	....	977 26	....	....	....	....	....	....

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c.	$ c.
Lambton	Sarnia	Sheriff	Jas. Flintoft	2,447 34	....
		Surrogate Judge	Judge Robinson	513 25	....
		Local Masters	"	....	....
			Judge Mackenzie	103 50	....
		County Attorney	J. P. Bucke	700 55	....
		Clerk of the Peace	"	1,282 55	....
		Local Registrar	W. R. Gemmell	431 75	675 00
		County Court Clerk	"	617 75	....
		Surrogate Registrar	"	964 92	....
Lanark	Perth	Sheriff	James Thompson ...	1,602 18	....
		Surrogate Judge. .. .	Judge Senkler	288 00	....
		Local Master	"	148 10	....
		Crown Attorney	W. G. Malloch	586 16	....
		Clerk of the Peace	"	505 94	.. ..
		Local Registrar	C. Rice	150 80	675 00
		County Court Clerk	"	302 10	....
		Surrogate Registrar	"	542 51	....
Leeds and Grenville	Brockville	Sheriff	James Smart	3,217 82	....
		Surrogate Judge	Judge McDonald	commuted	600 00
		Local Masters	"	194 36	....
			Judge Reynolds	261 27	.. ..
		Crown Attorney	M. M. Brown	429 70	....
		Clerk of the Peace. ...	"	791 74	....
		Local Registrar	S. Reynolds	306 05	750 00
		County Court Clerk	"	712 01	....
		Surrogate Registrar	"	1,077 19	....
Lennox and Addington ...	Napanee	Sheriff	G. D. Hawley	1,157 36	....
		Surrogate Judge	Judge Wilkinson	commuted	400 00
		Local Master	S. S. Lazier	302 20	....
		Crown Attorney	S. C. Warner	178 35	....
		Clerk of the Peace	"	704 10	....

Judicial Officers for the Province of Ontario, etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
....	2,447 34	1,798 34	769 43	2,567 77	975 81	1,591 96	....	1.591 96
....	513 25	....	....	513 25	....	513 25	....	513 25
....	....	....	....	....	....	....	....	....
....	103 50	55 00	73 00	128 00	....	128 00	....	128 50
700 55	1,983 10	528 05	368 75	2,203 95	385 55	1,818 40	....	1,81 40
1,282 55	....	1,179 75	127 40	....	....	....	....	....
1,106 75	2,689 42	1,106 75	....	2,689 42	133 00	2.556 42	166 92	2,389 50
617 75	....	617 75	....	....	....	....	....	....
964 92	....	964 92	....	....	....	....	....	....
....	1,602 18	989 07	355 89	1,344 96	522 95	822 01	....	822 01
288 00	436 10	288 00	....	477 66	....	477 66	....	477 66
148 10	....	....	189 66	....	....	....	....	....
586 16	1,092 10	423 89	64 56	1,001 59	114 16	887 43	....	887 43
505 94	....	259 20	253 94	....	....	....	....	....
825 80	1,670 41	687 25	37 40	1,615 61	35 85	1.579 76	7 97	1.571 79
302 10	....	221 29	81 25	....	....	....	....	....
542 51	....	509 71	78 71	....	....	....	....	....
....	3,217 82	2,480 34	563 03	3.043 37	1,199 11	1.844 26	....	1,844 26
600 00	794 36	600 00	....	885 75	....	885 75	....	885 75
194 36	....	138 34	147 41	....	....	....	....	....
261 27	261 27	261 27	56 53	317 80	....	....	....	317 80
429 70	1,221 44	429 70	....	1,221 44	122 50	1.098 94	....	1,098 94
791 74	....	791 74	....	....	....	....	....	....
1,056 05	2,845 25	1,056 05	....	2,845 25	432 12	2,413 13	132 63	2,280 50
712 01	....	712 01	....	....	....	....	....	....
1,077 19	....	1,077 19	....	....	....	....	....	....
....	1,157 36	902 13	319 84	1,221 97	147 50	1.074 47	....	1,074 47
....	400 00	....	....	400 00	....	400 00	....	400 00
....	302 20	261 00	55 00	316 00	105 00	211 00	....	211 00
178 35	882 45	120 15	88 50	863 15	90 65	772 50	....	772 50
704 10	....	460 58	193 92	....	....	....	....	....

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c.	$ c.
Lennox and Add'tn.—*Con.*	Napanee	Local Registrar	W. P. Deroche	412 10	600 00
		County Court Clerk	"	267 15	....
		Surrogate Registrar	"	507 52	....
Lincoln	St. Catharines	Sheriff	Thos. C. Dawson	2,429 14	....
		Surrogate Judge	Judge Senkler	commuted	566 00
		Local Master	F. W. Macdonald	679 56	....
		Deputy Registrar	"	190 49	....
		Crown Attorney	M. Brennan	403 60	....
		Clerk of the Peace	"	923 06	.. ..
		Deputy Clerk of Crown	J. Clench	145 95	450 00
		County Court Clerk	"	503 56	....
		Surrogate Registrar	"	634 47	....
Manitoulin	Gore Bay	District Court Clerk	W. S. Frances	114 58	350 00
		Surrogate Registrar	"	75 78	....
Middlesex	London	Sheriff	D. M. Cameron	4,302 42	....
		Surrogate Judge	Judge Elliott	commuted	1,000 00
		Local Master	(b) R. K. Cowan	473 97	....
		Deputy Registrar	"	450 89	....
		Crown Attorney	Jas. Magee, Q.C.	1,642 97	... .
		Clerk of the Peace	"	1,671 31	....
		Deputy Clerk of Crown	John Macbeth	462 80	500 00
		County Court Clerk	"	1,064 35	....
		Surrogate Registrar	"	2,130 70	....
Muskoka	Bracebridge	Sheriff	J. W. Bettes	1,941 57	500 00
		Surrogate Judge	Judge Mahaffy	36 25	....
		Local Master	"	56 00	....
		Crown Attorney	Thos. Johnson	623 40	250 00
		Clerk of the Peace	"	736 51	....
		Local Registrar	Isaac Huber	48 60	600 00

(b) From 17th April, 1897.

Judicial Officers in the Province of Ontario, etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c	$ c.	$ c.	$ c.
1,012 10	1,786 77	1,012 10	....	1,786 77	72 00	1.714 77	21 47	1,693 30
267 15	....	267 15	....	... ...	....	....	....	....
507 52	....	507 52	....	....	....	... .	....	....
....	2,429 14	2,221 52	134 33	2,355 85	530 16	1,825 69	....	1,825 69
....	566 00	....	....	566 00	....	....	....	566 00
679 56	870 05	223 07	998 21	1,431 53	....	1,431 53	....	1,431 53
190 49	....	108 03	102 22	....	....	....	....	....
403 60	1.326 66	403 60	....	1,326 66	86 00	1,240 66	....	1,240 66
923 06	. ...	923 06	.. ..	....	....	....	....	....
595 95	1 733 98	585 05	46 50	1,723 63	181 00	1.542 54	4 25	1.538 29
503 56	....	438 46	15 30	....	....	.. . .	....	....
634 47	....	634 47	3 85	....	... .	....	....	....
464 58	540 36	464 58	....	540 36	. ...	540 36	. .. .	540 36
75 78	... .	75 78	....	....	....	....	....	... .
....	4,302 42	4,223 26	134 81	4,358 07	2.009 90	2,348 17	34 81	2,313 36
....	1.000 00	....	....	1.000 00	....	1,000 00	....	1,000 00
473 97	924 86	295 75	....	700 64	132 05	568 59	....	568 59
450 89	.. ..	404 89	....	....	....	....	....	....
1,642 97	3,314 28	1.257 47	327 00	3,295 74	866 50	2,429 24	42 92	2,386 32
1,671 31	....	1,139 31	571 96	....	....	....	....	.. . .
962 80	4.157 85	843 50	86 20	4,041 40	1,056 90	2,984 50	295 35	2,689 15
1,064 35	. ...	1,018 15	14 45	....	....	....	....	....
2,130 70	....	2.079 10	....	... .	... .	....	....	....
2,441 27	2.441 57	1,707 81	450 24	2,158 05	850 03	1,308 02	....	1,308 02
36 25	92 25	36 25	....	92 25	....	92 25	....	92 25
56 00	......	56 00	....	......	....	....	....	....
873 40	1.609 91	687 40	206 40	1,744 88	420 15	1,324 73	....	1,324 73
736 51	.....	464 95	386 13	....	... ...	....	....	....
648 60	816 53	648 60	.. ..	816 53	18 75	797 78	.. ..	797 78

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c	$ c
Muskoka.—*Con.*	Bracebridge ...	District Court Clerk....	Isaac Huber	66 18	....
		Surrogate Registrar ...	"	101 75	....
Nipissing	North Bay	Sheriff	H. C. Varin	1,911 41	500 00
		Surrogate Judge	Judge Valin	40 25	....
		Local Master	"	4 70	....
		Crown Attorney.... . .	A. G. Browning	211 30	250
		Clerk of the Peace......	"	206 98	....
		Local Registrar	Thos J. Bourke	36 20	150 0
		County Court Clerk	"	233 45	450 00
		Surrogate Registrar	"	88 40	....
Norfolk	Simcoe	Sheriff	Jos. Jackson	1,638 24	....
		Surrogate Judge........	Judge Robb	299 25	....
		Local Master	"	20 12	....
		Crown Attorney	J. H. Ansley........	513 30	....
		Clerk of the Peace	"	870 59	....
		Local Registrar	C. C. Rapelje........	221 70	675 00
		County Court Clerk	"	396 50	....
		Surrogate Registrar	"	757 05	....
Northumberland and Durham..	Cobourg	Sheriff	I. O. Proctor	3,609 27	....
		Surrogate Clerk	Judge Benson	commuted	840 00
		Local Master	J. H. Dumble	134 30	....
		Crown Attorney	J. W. Kerr.	1,354 13	....
		Clerk of the Peace	"	1,046 33	....
		Local Registrar.........	John Fisher	233 95	750 00
		County Court Clerk.....	"	725 41	....
		Surrogate Registrar	"	1,237 02	.. ..
Ontario	Whitby	Sheriff	J. F. Paxton	1,853 80	....
		Surrogate Judge........	Judge Dartnell	606 50	....
		Local Master	"	286 80	....

Judicial Officers in the Provinces of Ontario, etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V., c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
66 18		66 18						
101 75		101 75						
2,411 41	2,411 41	1,399 86	213 70	1,613 56	1,206 20	407 36		407 36
40 25	44 95	40 25		44 95				44 95
4 70		4 70						
461 30	668 28	461 30	101 25	839 02	67 15	771 87		771 87
206 98		206 98	69 49					
186 20	958 05	186 20		958 05	60 02	898 03		898 03
683 45		683 45						
88 40		88 40						
	1,638 24	1,188 24	400 61	1,588 85	332 65	1,256 20		1,256 20
299 25	319 37	299 25		352 93	20 15	332 78		332 78
20 12		20 12	13 56					
513 30	1,383 89	508 30		1,375 49	33 79	1,341 70		1,341 70
870 59		866 79	40					
896 70	2,050 25	870 20	17 70	2,087 62	45 80	2,041 82	58 36	1,983 46
396 50		272 56	93 15					
757 05		618 62	215 39					
	3,609 27	3,017 53	900 59	3,918 12	1,970 28	1,947 84		1,947 84
	840 00			840 00		840 00		840 00
	134 30			134 30	5 00	129 30		129 30
1,354 13	2,400 46	1,104 61	268 17	2,443 55	414 00	2,029 55	2 95	2,026 60
1,046 33		658 72	412 05					
988 95	2,951 38	951 75	43 75	2,872 72	541 36	2,331 36	116 27	2,215 09
725 41		682 48	11 20					
1,237 02		1,166 04	17 50					
	1,853 80	1,322 25	492 59	1,814 84	460 16	1,354 68		1,354 68
606 50	893 30	606 50		887 80		887 80		887 80
286 80		281 30						

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government
				$ c.	$ c.
Ontario.—*Con*	Whitby	Crown Attorney	J. E. Farewell, Q.C.	498 40	...
		Clerk of the Peace	“	1,298 45	...
		Local Registrar	L. T. Barclay	44 20	675 00
		County Court Clerk	“	495 60	...
		Surrogate Registrar	“	1,008 60	...
Oxford	Woodstock	Sheriff	James Brady	2,790 72	...
		Surrogate Judge	Judge Finkle	734 25	...
		Local Master	W. T. McMullen	1,459 20	...
		Deputy Registrar	“	202 90	...
		Crown Attorney	F. R. Ball, Q.C.	696 40	...
		Clerk of the Peace	“	770 16	...
		Deputy Clerk of Crown	James Canfield	514 00	450 00
		County Court Clerk	“	693 80	...
		Surrogate Registrar	“	1,589 35	...
Parry Sound	Parry Sound	Sheriff	Samuel Armstrong	1,723 15	500 00
		Surrogate Judge	Judge Mahaffy	28 00	...
		Local Master	“	...	...
		Crown Attorney	See under Muskoka	...	...
		Clerk of the Peace			
		Local Registrar	E. Jordon	25 95	600 00
		District Court Clerk	“	21 30	...
		Surrogate Registrar	“	77 24	...
Peel	Brampton	Sheriff	Robert Broddy	1,838 38	...
		Surrogate Judge	Judge McGibbon	421 75	...
		Local Master	“	56 55	...
		Crown Attorney	W. H. McFadden	473 95	...
		Clerk of the Peace	“	993 88	...
		Local Registrar	J. A. Austin	86 20	600 00
		County Court Clerk	“	364 37	...
		Surrogate Registrar	“	732 38	...

Judicial Officers in the Province of Ontario, etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
498 40	1,796 95	380 40	104 75	1,714 04	406 47	1,307 57	....	1,307 07
1,298 45	....	784 73	444 16	....	....	....	....	....
719 20	2,223 40	719 20	....	2,223 40	325 00	1,898 40	39 84	1,858 56
495 60	....	495 60	....	....	....	....	....	....
1,008 60	....	1,008 60	....	....	....	....	....	....
....	2,790 72	2,563 91	262 28	2,826 19	1,266 26	1,559 93	....	1,559 93
....	734 25	....	....	734 25	....	734 25	....	734 25
1,459 20	1,662 10	949 26	254 52	1,406 68	104 00	1,302 68	....	1,302 68
202 90	....	202 90	....	....	....	....	....	....
696 40	1,466 56	696 40	108 40	1,929 51	25 00	1,904 51	....	1,904 51
770 16	....	770 16	354 55	....	....	....	....	....
964 00	3,247 15	750 00	179 00	3,039 00	275 15	2,763 85	229 15	2,534 70
693 80	....	482 00	185 00	....	....	....	....	....
1,589 35	....	963 00	480 00	....	....	....	....	....
2,223 15	2,223 15	1,600 18	711 21	2,311 39	1,121 82	1,189 57	....	1,189 57
....	28 00	....	....	28 00	....	28 00	....	28 00
....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....
625 95	724 49	625 95	....	724 49	4 36	720 13	....	720 13
21 30	....	21 30	....	....	....	....	....	....
77 21	....	77 24	....	....	....	....	....	....
....	1,838 38	1,428 17	575 69	2,003 86	946 29	1,057 57	....	1,057 57
421 75	478 30	421 75	....	513 13	....	513 13	....	513 13
86 55	....	13 35	78 03	....	....	....	....	....
473 95	1,467 83	224 50	101 00	1,283 83	80 30	1,203 53	....	1,203 53
993 88	....	696 48	261 85	....	....	....	....	....
686 20	1,782 95	686 20	10 60	1,791 92	142 83	1,649 09	14 90	1,634 19
364 37	....	361 02	21 65	....	....	....	....	....
732 38	....	689 20	23 25	....	....	....	....	....

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c.	$ c.
Perth	Stratford	Sheriff	John Hossie	2,202 09	
		Surrogate Judge	Judge Woods	775 00	
		Local Master	J. E. Harding, Q.C.	804 76	
		Crown Attorney	J. Idington, Q.C.	497 80	
		Clerk of the Peace	"	757 99	
		Local Registrar	Jas. Macfadden	548 90	675 00
		County Court Clerk	"	480 65	
		Surrogate Registrar	"	1,184 30	
Peterborough	Peterborough	Sheriff	Jas. A. Hall	1,842 25	
		Surrogate Judge	Judge Weller	294 00	
		Local Master	"	283 00	
		Crown Attorney	R. E. Wood	413 22	
		Clerk of the Peace	"	772 74	
		Local Registrar	John Maloney	205 25	675 00
		County Court Clerk	"	392 35	
		Surrogate Registrar	"	475 83	
Prescott and Russell	L'Orignal	Sheriff	Albert Hagar	1,777 15	500 00
		Surrogate Judge	Judge O'Brian	161 50	
		Local Master	"	167 10	
		Crown Attorney	John Maxwell	368 93	
		Clerk of the Peace	"	894 97	
		Local Registrar	John Fraser	123 55	675 00
		County Court Clerk	"	201 53	
		Surrogate Registrar	"	368 51	
Prince Edward	Picton	Sheriff	Jas. Gillespie	1,446 52	200 00
		Surrogate Judge	Judge Merrill	180 75	
		Local Master	C. H. Widdifield	145 55	
		Crown Attorney	J. Roland Brown	189 30	

Judicial Officers in the Province of Ontario, etc —*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
....	2,202 09	1,457 35	552 06	2,009 41	1,032 19	977 22	....	977 2
....	775 00	....	....	775 00	.. ..	775 00	....	775
....	804 76	804 76	27 50	832 26	....	832 26	... .	832 26
497 80	1,255 79	417 10	76 00	1,268 95	268 54	1,000 41	....	1,000 41
757 99	....	424 95	350 90	....	....	....	....	....
1,223 90	2,888 85	1,223 90	100 60	2,936 40	1,100 00	1,836 40	33 64	1,802 76
480 65	... ...:...	436 00	....	....	....	....	....	. .. .
1,184 30	....	1,175 90	....	....	....	....	....	....
....	1,842 05	1,805 43	16 10	1,821 53	687 38	1,134 15	....	1,134 15
294 00	577 00	294 00	....	577 00	....	577 00	....	577 00
283 00	....	283 00	....	....	....	....	....	....
413 22	1,185 96	340 91	129 31	1,183 93	29 00	1,154 93	....	1,154 93
772 74	....	374 08	339 63	....	....	....	....	....
880 25	1,748 43	880 25	....	1,748 43	283 00	1,465 43	....	1,465 43
392 35	....	392 35	.. ..	....	....	....	....	....
475 83	....	475 83	....	....	....	....	....	....
2,277 15	2,277 15	1,703 43	474 37	2,177 80	833 07	1,344 73	....	1,344 73
161 50	268 60	161 50	....	268 60	....	268 60	....	268 60
107 10	....	107 10	....	....	....	....	....	....
368 93	1,263 90	368 93	....	1,263 90	55 08	1,208 82	....	1,208 82
894 97	....	894 97	....	....	....	....	....	....
798 55	1,368 59	789 05	20 14	1,353 63	225 50	1,128 13	....	1,128 13
201 53	....	197 33	7 30	....	....	... .	....	....
368 51	....	267 90	71 91	....	... .	....	....	....
1,646 52	1,646 52	1,390 51	255 04	1,645 55	939 17	706 38	....	706 38
....	180 75	....	....	180 75	....	180 75	.. ..	180 75
....	145 55	48 00	36 93	84 93	....	84 93	....	84 93
189 30	838 84	120 30	19 00	763 10	41 48	721 62	....	721 62

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c.	$ c.
Prince Edward—*Con.*	Picton	Clerk of the Peace......	J. Roland Brown....	649 54	....
		Local Registrar	W. H. R. Allison, Q C	57 39	600 00
		County Court Clerk	"	473 62	....
		Surrogate Registrar	"	350 27	....
Rainy River.. .	Rat Portage....	Sheriff	W. H. Carpenter	1,545 85	1,000 00
		Surrogate Judge.... ..	Judge Fitzgerald....	34 00	... .
		Local Master	"	....	....
		District Crown Attorney	H. Langford	147 40	250 00
		Clerk of the Peace......	"	152 30	....
		Local Registrar	F. J. Apjohn........	341 30	700 00
		District Court Clerk....	"	182 60	....
		Surrogate Registrar	"	70 49	....
Renfrew	Pembroke	Sheriff	Wm. Moffatt	2,535 25	....
		Surrogate Judge........	Judge Deacon	commuted	264 00
		Local Master	"	57 70	....
		Crown Attorney........	J. A. Metcalfe......	737 38	... .
		Clerk of the Peace	"	587 15	....
		Local Registrar	Arch. Thomson......	52 00	600 00
		County Court Clerk	"	425 33	....
		Surrogate Registrar	"	413 19	....
Simcoe	Barrie.........	Sheriff	Hon. Charles Drury .	3,842 42	....
		Surrogate Judge	Judge Ardagh.......	commuted	585 00
		Local Master	J. R. Cotter	543 35	....
		Deputy Registrar......	"	295 85	....
		Crown Attorney........	"	1,155 55	....
		Clerk of the Peace......	"	1,131 96	....
		Deputy Clerk of the Crown	J. McL. Stevenson ..	306 55	500 00
		County Court Clerk	" ..	876 77	....
		Surrogate Registrar.....	" ..	1,315 77	....

Judicial Officers in the Province of Ontario etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	c.
649 54	....	404 85	218 95	....	....	....	....	....
657 39	1,481 28	657 39	....	1,481 28	46 75	1,434 53	....	1,434 53
473 62	....	473 62	....	....	....	....	....	....
350 27	....	350 27	....	....	....	....	....	....
2,545 85	2,545 85	2,085 64	506 44	2,592 08	991 69	1,600 39	....	1,600 39
34 00	....	34 00	....	....	....	....	....	....
See	under Thunder Bay.		....	....	....	....	....	....
397 40	549 70	397 40	....	549 70	8 00	541 70	....	541 70
152 30	....	152 30	....	....	....	....	....	....
1,041 30	1,294 39	1,041 30	....	1,294 39	20 00	1,274 39	....	1,274 39
182 60	....	182 60	....	....	....	....	....	....
70 49	....	70 49	....	....	....	....	....	....
....	2,535 25	2,285 23	78 11	2,363 34	774 00	1,589 34	....	1,589 34
264 00	321 50	264 00	....	321 70	2 03	319 67	....	319 67
57 70	....	57 70	....	....	....	....	....	....
737 38	1,324 53	737 38	41 00	1,627 34	178 07	1,445 27	....	1,445 27
587 15	....	587 15	261 81	....	....	....	....	....
652 00	1,490 52	652 00	....	1,490 52	133 50	1,357 02	....	1,357 02
425 33	....	425 33	....	....	....	....	....	....
413 19	....	413 19	....	....	....	....	....	....
....	3,842 42	2,863 02	954 53	3,817 55	1,944 62	1,872 93	....	1,872 93
....	585 00	....	....	585 00	....	585 00	....	585 00
548 35	3,131 71	548 35	....	3,131 71	215 32	2,916 39	(a) 10 65	2,905 74
295 85	....	295 85	....	....	....	....	....	....
1,155 55	....	1,155 55	....	....	....	....	....	....
1,131 96	....	1,131 96	....	....	....	....	....	....
806 55	2,999 09	806 55	....	2,999 09	432 00	2,567 09	170 12	2,396 97
876 77	....	876 77	....	....	....	....	....	....
315 7	....	1 315 77	....	....	....	....	....	....

(a) Payable only on income of joint offices of Crown Attorney and Clerk of the Peace, $2,106.59.

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c.	$ c.
Stormont, Dundas and Glengarry	Cornwall	Sheriff	A. McNabb	3,254 67	....
		Surrogate Judge	Judge Pringle	500 75	....
		Local Master	"	289 20	....
		Crown Attorney	Jas. Dingwall	187 88	....
		Clerk of the Peace	"	610 11	....
		Local Registrar	John A. McDougald	156 75	750 00
		County Court Clerk	"	660 95	....
		Surrogate Registrar	Helen McDonald	893 64	....
Thunder Bay	Port Arthur	Sheriff	Alex. W. Thompson	1,540 00	1,000 00
		Surrogate Judge	Judge Fitzgerald	48 00	....
		Local Master	"	9 00	....
		Crown Attorney	Thos. A. Gorham	177 80	250 00
		Clerk of the Peace	"	141 20	....
		Local Registrar	Jas. Meek	180 25	600 00
		County Court Clerk	"	280 20	....
		Surrogate Registrar	"	108 95	....
Victoria	Lindsay	Sheriff	John McLennan	2,186 26	....
		Surrogate Judge	Judge Dean	commuted	500 00
		Local Master	"	commuted	900 00
		Crown Attorney	A. P. Devlin	455 60	....
		Clerk of the Peace	"	704 91	....
		Local Registrar	Wm. Grace	88 00	675 00
		County Court Clerk	"	319 90	....
		Surrogate Registrar	"	441 67	
o	Berlin	Sheriff	Moses Springer	1,981 24	100 00
		Surrogate Judge	Judge Chisholm	914 25	....
		Local Master	J. J. A. Weir (b)	44 40	....
		Crown Attorney	W. H. Bowlby, Q. C.	508 30	....
		Clerk of the Peace	"	1,180 50	....
		Local Registrar	John McDougall	254 05	1,075 00

(b) From 28th May, 1897.

Judicial Officers in the Province of Ontario, etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V., c. 9.	Actual net income.
$ c.	$ c.	c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
....	3,254 67	2,908 60	117 80	3,026 40	2,012 51	1,013 89	....	1,013 89
500 75	789 95	500 75	....	788 25	....	788 25	....	788 95
289 20	....	287 50	....	....	....	....	....	....
187 88	797 99	112 83	38 80	711 25	44 06	667 19	....	667 19
610 11	....	374 82	184 80	....	....	....	....	....
906 75	1,567 70	906 75	....	1,567 70	17 50	1,550 20	5 02	1,545 18
660 95	....	660 95	....	....	....	....	....	....
....	893 64	893 64	....	893 64	....	893 64	....	893 64
2,540 00	2,540 00	1,897 87	594 08	2,491 95	552 26	1,939 69	....	1,939 69
48 00	57 00	48 00	....	57 00	....	57 00	....	57 00
9 00	....	9 00	....	....	....	....	....	....
427 80	569 00	427 80	41 50	707 31	109 25	598 06	....	598 06
141 20	....	141 20	96 81	....	....	....	....	....
780 25	1,169 40	709 69	38 00	1,187 02	34 75	1,152 27	....	1,152 27
280 20	....	270 70	47 68	....	....	....	....	....
108 95	....	108 95	12 00	....	....	....	....	....
....	2,186 26	1,613 90	582 71	2,196 61	497 30	1,699 31	....	1,699 31
....	1,400 00	....	....	1,400 00	....	1,400 00	....	1,400 00
....	....	....	....	....	....	....	....	....
455 60	1,160 51	309 10	80 00	1,127 21	....	1,127 21	....	1,127 21
704 91	....	476 28	261 83	....	....	....	....	....
763 00	1,524 57	738 00	34 00	1,540 53	65 00	1,475 53	....	1,475 53
319 90	......	216 86	118 00	....	....	....	....	....
441 67	....	406 67	27 00	....	....	....	....	....
2,081 24	2,081 24	2,057 56	178 35	2,235 91	788 99	1,446 92	....	1,446 92
....	914 25	....	....	914 25	....	914 25	....	914 25
....	44 40	42 00	....	42 00	30	41 70	....	41 70
508 30	1,688 80	411 90	146 80	1,749 90	424 80	1,325 10	....	1,325 10
1,180 50	....	1,131 00	60 20	....	....	....	....	....
1,329 05	1,744 02	1,329 05		1,744 02	330 00	1,414 02	....	1,414 02

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c.	$ c.
Waterloo.—*Con.*	Berlin.........	County Court Clerk ...	John McDougall	414 97	....
		Surrogate Registrar	A. J. Peterson	1,074 39	....
Welland	Welland	Sheriff	James Smith	2,021 75	....
		Surrogate Judge........	Judge Fitzgerald	415 00	....
		Local Master	"	37 78	....
		Crown Attorney	T. D. Cowper........	540 00	....
		Clerk of the Peace......	"	1,399 69	....
		Local Registrar.........	I. P. Wilson	160 50	600 00
		County Court Clerk.....	"	323 90	....
		Surrogate Registrar	"	872 20	....
Wellington	Guelph	Sheriff	R. McKim	2,362 42	....
		Surrogate Judge........	Judge Chadwick.....	888 00	....
		Crown Attorney	H. W. Peterson ...	950 43	....
		Clerk of the Peace......	"	2,069 60	....
		Local Master	A. M. McKinnon....	1,337 01	....
		Local Registrar	"	140 24	750 00
		County Court Clerk	Wm. Carroll.........	556 10	....
		Surrogate Registrar	Alex. Mackenzie.....	1,468 76	....
Wentworth.....	Hamilton	Sheriff	John H. Murton	3,582 96	....
		Surrogate Judge........	Judge Snider	1,000 00	....
		Local Master and Deputy Registrar	J. E. O'Reilly	Com'uted.	3,500 00
		Crown Attorney	John Crerar, Q. C....	1,453 60	....
		Clerk of the Peace......	"	831 00	....
		Deputy Clerk of Crown.	S. H. Ghent.........	518 37	500 00
		County Court Clerk	"	1,322 43	....
		Surrogate Registrar.....	"	1,746 59	....

Judicial Officers in the Province of Ontario, etc.—*Continued.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
414 97	....	414 97	....	....	....	....	....	....
1,074 39	1,074 39	1,074 39	....	1,074 39	400 00	674 39	....	674 39
....	2,021 75	1,687 00	384 00	2,071 00	565 25	1,505 75	....	1,505 75
415 00	452 78	415 00	....	511 86	511 86	511 86	....	511 86
37 78	....	5 16	91 70	....	....	....	....	....
540 00	1,939 69	485 50	275 00	2,286 02	654 48	1,631 54	....	1,631 54
1,399 69	....	898 89	626 63	....	....	....	....	....
760 50	1,956 60	707 60	8 50	1,940 90	321 00	1,619 90	11 99	1,607 91
323 90	....	297 70	47 20	....	....	....	....	....
872 20	....	872 20	7 70	....	....	....	....	....
....	2,362 42	1,933 10	648 46	2,581 56	1,509 50	872 16	....	872 16
....	838 00	....	....	888 00	....	888 00	....	888 00
950 43	3,020 03	639 93	277 33	2,844 60	776 00	2,068 60	6 86	2,061 74
2,069 60	....	1,805 34	122 00	....	....	....	....	....
1,337 01	2,227 25	1.173 40	89 56	2,153 20	208 45	1,944 75	....	1,944 75
890 24	....	890 24	....	....	....	....	....	....
....	556 10	552 55	4 25	556 80	4 30	552 50	....	552 50
....	1,468 76	1,423 76	70 58	1,494 34	174 00	1,320 34	....	1,320 34
....	3,582 96	2,867 46	660 32	3,527 78	1,778 88	1,748 90	....	1,748 90
....	1,000 00	....	....	1,000 00	....	1,000 00	....	1,000 00
....	3,500 00	....	....	3,500 00	192 75	3,307 25	....	3,307 25
1,453 60	2,284 60	1,453 60	....	2,284 60	300 00	1,984 60	....	1,984 60
831 00	....	831 00	....	....	....	....	....	....
1,018 37	4,087 39	968 57	58 85	4,101 93	714 77	3,387 16	493 58	2,893 58
1,322 43	....	1,136 92	173 38	....	....	....	....	....
1,746 59	....	1,617 01	147 20	....	....	....	....	....

APPENDIX F.—Return of fees and emoluments of County

County or district.	County town.	Office.	Officer.	Amount earned.	Salary paid by Government.
				$ c.	$ c.
York	Toronto	Sheriff	J. H. Widdifield	5,979 34	....
		Surrogate Judge........	Judge McDougall ...	2,975 75	....
		"	Judge Morgan.......	....	666 00
		"	Judge Morson	....	666 00
		County Attorney	H. H. Dewart	2,687 87	....
		Clerk of the Peace......	T. H. Bull	3.290 67	....
		County Court Clerk	Hon. A. M. Ross ...	4,717 80	....
		Surrogate Registrar	Jos. Tait............	4,508 97	....
Toronto	Toronto	Sheriff	Fred Mowat.........	9,147 71	....
			J. W. Curry.........	3,374 00	....

Judicial Officers in the Province of Ontario, etc.—*Concluded.*

Total earnings and salary in each office.	Total earnings and salary by officer in all his offices.	Total received for present year's services.	Total received for previous year's services.	Total receipts by officer from all his offices.	Total disbursements.	Net income.	Amount paid to Government under 57 V. c. 9.	Actual net income.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
....	5,979 34	4,571 45	1,328 10	5,899 55	2,817 18	3,082 37	159 63	2,922 74
....	2,975 75	....	....	2,975 75	....	2,975 75	....	2,975 75
....	666 00	....	....	666 00	....	666 00	....	666 00
....	666 00	....	....	666 00	....	666 00	....	666 00
....	2,687 87	1,878 68	677 00	2,555 68	797 50	1,758 18	....	1,758 18
....	3,290 67	2,236 53	221 75	2,458 28	800 00	1,658 28	....	1,658 28
....	4,717 80	4,682 90	19 55	4,702 45	1,593 36	3,109 09	354 54	2,754 55
....	4,508 97	4,508 97	....	4,508 97	1,370 16	3,138 81	369 40	2,769 41
....	9,147 71	6,558 19	1,957 87	8,516 06	4 645 86	a3,870 20	442 68	3,427 52
....	3,374 00	2,518 00	821 00	3,339 00	339 25	2,999 75	149 95	2,849 80

a Of this $84.90 was earned before 1893.

APPENDIX G—Showing total and net receipts of officers in 1897, and the earnings of

County or district.	County town.	Office.	Officer.
Algoma	Sault Ste. Marie	Sheriff	W. H. Carney
		Surrogate Judge	Judge Johnston
		Local Master	"
		District Crown Attorney	J. J. Kehoe
		Clerk of the Peace	"
		Local Registrar, *pro tem*	T. H. Murray
		District Court Clerk	"
		Surrogate Registrar	"
Brant	Brantford	Sheriff	Wm Watt, jr
		Surrogate Judge	Judge Jones
		Local Master	"
		Crown Attorney	G. R. VanNorman, Q.C
		Clerk of the Peace	"
		Local Registrar	W. Rubidge
		County Court Clerk	"
		Surrogate Registrar	"
Bruce	Walkerton	Sheriff	F. S. O'Connor
		Surrogate Judge	Judge Barrett
		Local Master and Local Registrar.	W. A. McLean
		Crown Attorney	Thomas Dixon
		Clerk of the Peace.	"
		County Court Clerk	Matthew Goetz
		Surrogate Registrar	"
Carleton	Ottawa	Sheriff	John Sweetland
		Surrogate Judge	Judge Ross
		"	Judge Mosgrove
		Local Master	R. Cassels, Q.C
			W. L. Scott

each officer payable by the Government, the County, and the general public respectively.

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
3,096 12	1,767 99	*2,262 71	....	913 18
22 75	22 75	....	....	22 75
7 00	7 00	....	....	7 00
1,132 41	1,094 66	487 85	....	....
....	....	†927 05	....	....
1,129 38	1,089 38	150 00	....	90 50
....	....	600 00	....	247 23
....	....	....	....	41 65
2,026 07	1,603 60	1,036 11	457 36	603 73
....	commuted at	588 00	....	....
....	commuted at	577 00	....	....
1,091 05	1,091 05	399 60	104 95	....
....	....	165 55	524 95	....
2,112 28	1,286 78	675 00	....	118 00
....	....	....	....	456 00
....	....	....	....	875 28
2,967 87	1,972 69	940 72	543 52	1,525 34
660 60	660 60	....	....	660 60
....	commuted at	1,300 00	....	....
2,177 69	2,068 90	539 57	33 33	9 00
....	....	193 50	1,132 43	16 80
2,161 62	1,790 36	....	....	1,095 90
....	....	....	....	1,382 43
4,372 27	2,271 74	1,910 70	783 02	1,857 32
....	commuted	500 00	....	....
....	commuted	500 00	....	....
....	....	....	....	....
3,051 26	2,839 74	....	....	2,661 80

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* This includes $1,000.00 salary. † This includes $400.00 salary

APPENDIX G.—Showing total and net receipts of

County or district.	County town.	Office.	Officer.
Carleton.—*Con*	Ottawa	Deputy Registrar	W. L .Scott
		Crown Attorney	J. A. Ritchie
		Clerk of the Peace	"
		Deputy Clerk of Crown	J. P. Featherston
		County Court Clerk	"
		Surrogate Registrar	"
Dufferin	Orangeville	Sheriff	Thomas Bowles
		Surrogate Judge	Judge McCarthy
		Local Master	"
		Crown Attorney	W. J. L. McKay
		Clerk of the Peace	"
		Local Registrar	John McLaren
		County Court Clerk	"
		Surrogate Registrar	"
Elgin	St. Thomas	Sheriff	Dugald Brown
		Surrogate Judge	Judge Hughes
		Local Master	Robert Miller
		Crown Attorney	D. J. Donahue
		Clerk of the Peace	"
		Local Registrar	David McLaws
		County Court Clerk	"
		Surrogate Registrar	"
Essex	Sandwich	Sheriff	J. C. Iler
		Surrogate Judge	Judge Horne
		Local Master	J. F. Hare
		Deputy Registrar	"
		Crown Attorney	A. H. Clarke
		Clerk of the Peace	"
		Deputy Clerk of Crown	F. E. Marcon

officers for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
....	....	....	....	594 65
1,855 25	1,244 68	769 33	32 67	....
....	....	275 35	688 43	97 00
4,119 66	2,665 91	450 00	....	870 60
....	....	....	....	1,096 25
....	....	....	....	1,604 79
2,202 09	1,463 09	1,072 69	401 63	773 70
....	commuted	168 00	....	....
102 54	80 45	....	....	102 54
907 34	792 34	338 25	....	....
....	....	96 20	361 99	....
1,386 80	1,370 20	675 00	....	84 60
....	....	....	....	288 65
....	....	....	....	337 00
2,149 80	1,173 08	1,147 98	361 17	602 52
482 50	482 50	....	....	482 50
1,196 46	1,046 46	....	....	1,196 46
1,487 56	1,216 45	981 19	....	....
....	....	332 96	551 83	....
2,457 70	2,030 16	675 00	....	463 50
....	....	....	....	574 12
....	....	....	....	984 11
3,267 46	1,667 46	1,848 48	530 75	679 24
319 25	319 25	....	....	319 25
174 30	156 80	....	....	174 30
96 30	78 80	....	....	96 30
1,572 11	972 11	619 67	....	148 89
....	....	232 20	516 86	30 50
2,004 28	1,719 85	450 00	....	291 00

APPENDIX G.—Showing total and net receipts of

County or district.	County town.	Office.	Officer.
Essex.—*Continued*	Sandwich	County Court Clerk	F. E. Marcon
		Surrogate Registrar	"
Frontenac	Kingston	Sheriff	Wm. Ferguson
		Surrogate Judge	Judge Price
		Local Master	J. M. Machar, Q.C.
		Crown Attorney	J. L. Whiting, Q C
		Clerk of the Peace	"
		Local Registrar	Archibald McGill
		County Court Clerk	"
		Surrogate Registrar	"
Grey	Owen Sound	Sheriff	C. H. Moore
		Surrogate Judge	Judge Creasor
		Local Masters	" Judge Morrison
		Crown Attorney	A. G. McKay
		Clerk of the Peace	Wm Armstrong
		Local Registrar	George Inglis
		County Court Clerk	"
		Surrogate Registrar	"
Haldimand	Cayuga	Sheriff	R. H. Davis
		Surrogate Judge	Judge McMillan
		Local Master	"
		Crown Attorney	C. W. Colter
		Clerk of the Peace	"
		Local Registrar	Jas. Mitchell
		County Court Clerk	"
		Surrogate Registrar	"

officers for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
......	......	......	......	672 35
......	......	......	......	590 93
2,124 16	1,378 68	832 03	440 66	851 47
752 00	752 00	752·00	commuted	......
499 84	399 84	......	......	499 84
1,172 55	1,142 55	295 00	......	......
......	......	220 69	667 31	......
1,779 42	1,124 42	675 00	......	128 10
......	......	......	......	467 40
......	......	......	......	711 53
3,179 55	2,025 51	988 90	675 84	1,242 94
584 35	584 35	......	......	584 35
354 10	354 10	......	......	354 10
697 57	644 60	175 64	350 95	4 60
900 75	480 75	157 50	733 25	10 00
2,641 95	2,203 20	750 00	......	155 50
......	......	......	......	699 20
......	......	......	......	1,107 40
1,475 96	1,277 58	*907 41	387 48	226 95
385 15	385 15	......	......	385 15
124 25	124 25	......	......	124 25
1,437 67	1,100 67	501 79	18 57	......
......	......	140 10	962 55	87 43
1,696 60	1,636 44	600 00	......	137 80
......	......	......	......	219 80
......	......	......	......	739 00

*Of this $100 is salary.

Appendix G.—Showing total and net receipts of

County or district.	County town.	Office.	Officer.
Halton	Milton	Sheriff	M. Clements
		Surrogate Judge	Judge Hamilton
		Local Master	"
		Crown Attorney	T. G. Matheson
		Clerk of the Peace	"
		Local Registrar	W. A. Lawrence
		County Court Clerk	"
		Surrogate Registrar	"
Hastings	Belleville	Sheriff	Geo. F. Hope
		Surrogate Judge	Judge Lazier
		Local Master and Deputy Registrar.	S. S. Lazier
		Crown Attorney	P. J. M. Anderson
		Clerk of the Peace	"
		Deputy Clerk of Crown	A. G. Northrup
		County Court Clerk	"
		Surrogate Registrar	"
Huron	Goderich	Sheriff	R. G. Reynolds
		Surrogate Judge	Judge Masson
		Local Master	Judge Doyle
		Crown Attorney	Ira Lewis
		Clerk of the Peace	"
		Local Registrar	D. McDonald
		County Court Clerk	"
		Surrogate Registrar	"
Kent	Chatham	Sheriff	John R. Gemmill
		Surrogate Judge	Judge Bell
		Local Master and Deputy Registrar.	R. O'Hara

officers for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
1,257 20	861 00	593 28	339 15	335 63
288 75	287 75	....	....	288 75
....	....	....	....	....
1,974 15	1,865 99	464 60	....	11 00
....	....	106 85	1,244 58	32 35
1,220 64	920 64	600 00	....	29 30
....	....	....	....	155 30
....	....	....	....	436 04
3,062 64	2,236 45	1,181 10	691 95	1,367 78
....	commuted at	500 00	....	....
3,000 00	2,350 00	3,000 00	commuted	....
3,210 49	2,683 33	1,308 90	58 00	270 75
....	....	263 60	1,143 59	14 95
2,769 24	1,856 95	450 00	....	251 53
....	....	....	....	1,053 04
....	....	....	....	969 34
2,276 68	1,574 45	974 90	482 09	1,204 62
1,000 00	1,000 00	....	....	1,054 75
83 95	83 95	....	....	83 95
2,026 14	1,257 29	518 15	46 20	....
....	....	201 49	1,100 00....	....
3,338 06	2,487 10	619 56	....	335 90
....	....	....	....	467 85
....	....	....	....	1,914 75
2,937 70	1,968 64	1,429 63	745 15	718 11
....	commuted	450 00	....	....
....	commuted	1,600 00	....	....

APPENDIX G.—Showing total and net receipts of officers

County or district.	County town.	Office.	Officer.
Kent.—*Continued*	Chatham	Crown Attorney	Wm. Douglas, Q.C
		Clerk of the Peace	"
		Deputy Clerk of Crown	W. A. Campbell
		County Court Clerk	"
		Surrogate Registrar	"
Lambton	Sarnia	Sheriff	Jas. Flintoft
		Surrogate Judge	Judge Robinson
		Local Masters	" Judge Mackenzie
		Crown Attorney	J. P. Bucke
		Clerk of the Peace	"
		Local Registrar	W. R. Gemmill
		County Court Clerk	"
		Surrogate Registrar	"
Lanark	Perth	Sheriff	Jas. Thompson
		Surrogate Judge	Judge Senkler
		Local Master	"
		Crown Attorney	E. G. Malloch
		Clerk of the Peace	"
		Local Registrar	Charles Rice
		County Court Clerk	"
		Surrogate Registrar	"
Leeds and Grenville.	Brockville	Sheriff	James Smart
		Surrogate Judge	Judge McDonald
		Local Masters	" Judge Reynolds
		Crown Attorney	M. M. Brown
		Clerk of the Peace	"

for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
2,482 98	1,952 98	1,203 03	......	......
......	......	317 30	1,000 00	......
2,340 66	1,581 60	450 00	......	150 00
......	......	......	......	763 40
......	......	......	......	977 26
2,567 77	1,591 96	1,118 50	453 04	875 80
513 25	513 25	......	......	513 25
......	......	......	......	......
128 00	128 00	......	......	128 00
2,203 95	1,818 40	681 22	19 33	......
......	......	262 55	1,020 00	......
2,689 42	2,389 50	675 00	......	431 75
......	......	......	......	617 75
......	......	......	......	964 92
1,344 96	822 01	750 60	384 78	466 80
288 00	288 00	......	......	288 00
189 66	189 66	......	......	189 66
1,001 59	887 43	405 47	156 69	24 00
......	......	192 81	301 08	12 05
1,615 61	1,571 79	675 00	......	150 80
......	......	......	......	302 10
......	......	......	......	542 51
3,043 37	1,844 26	859 70	460 86	1,897 26
......	commuted.	600 00	......	......
285 75	285 75	......	......	285 75
317 80	317 80	......	......	317 80
1,221 44	1,098 94	429 70	......	......
......	......	165 03	612 71	14 00

APPENDIX G.—Showing total and net receipts of officers

County or district.	County town.	Office.	Officer.
Leeds and Grenville.—*Continued*	Brockville	Local Registrar	Saml. Reynolds
		County Court Clerk	"
		Surrogate Registrar	"
Lennox and Addt'n.	Napanee	Sheriff	G. D. Hawley
		Surrogate Judge	Judge Williamson
		Local Master	S. S. Lazier
		Crown Attorney	S. C. Warner
		Clerk of the Peace	"
		Local Registrar	W. P. Deroche
		County Court Clerk	"
		Surrogate Registrar	"
Lincoln	St. Catharines	Sheriff	Thomas C. Dawson
		Surrogate Judge	Judge Senkler
		Local Master and Deputy Registrar.	F. W. Macdonald
		Crown Attorney	M. Brennan
		Clerk of the Peace	"
		Deputy Clerk of Crown	J. Clench
		County Court Clerk	"
		Surrogate Registrar	"
Manitoulin	Gore Bay	District Court Clerk	Wm. S. Francis
		Surrogate Registrar	"
Middlesex	London	Sheriff	D. M. Cameron
		Surrogate Judge	Judge Wm. Elliott
		Local Master and Deputy Registrar	R. K. Cowan
		Crown Attorney	Jas. Magee, Q.C

for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
2,845 25	2,280 50	750 00	......	306 05
......	......	......	......	712 01
......	......	......	......	1,077 19
1,221 97	1,074 47	604 62	362 35	190 39
......	commuted.	400 00	......	......
316 00	211 00	......	......	316 00
863 15	772 50	147 35	6 00	25 00
......	......	81 75	582 45	39 90
1,786 77	1,693 30	600 00	......	412 10
......	......	......	......	267 15
......	......	......	......	507 52
2,355 85	1,825 69	1,053 50	179 00	1,196 64
......	commuted.	566 00	......	......
1,431 53	1,431 53	......	......	1,431 53
1,326 66	1,240 66	388 60	......	15 00
......	......	128 65	787 01	7 40
1,723 63	1,537 29	450 00	......	145 95
......	......	......	......	503 56
......	......	......	......	634 47
540 36	*540 36	350 00	......	114 58
......	......	......	......	75 78
4,358 07	2,313 36	1,867 15	1,326 02	1,109 25
......	commuted	1,000 00	......	......
700 64	568 59	......	......	700 64
3,295 74	2,386 32	1,540 89	47 33	54 75

* Including salary of $350.

APPENDIX G.—Showing total and net receipts of officers

County or district.	County town.	Office.	Officer.
Middlesex.—*Con.*	London	Clerk of the Peace	Jas. Magee, Q.C
		Deputy Clerk of Crown	John Macbeth
		County Court Clerk	“
		Surrogate Registrar	“
Muskoka	Bracebridge	Sheriff	James W. Bettes
		Surrogate Judge	Judge Mahaffy
		Local Master	“
		District Crown Attorney	Thomas Johnson
		Clerk of the Peace	“
		Local Registrar	Isaac Huber
		District Court Clerk	“
		Surrogate Registrar	“
Nipissing	North Bay	Sheriff	H. C. Varin
		Surrogate Judge	Judge Valin
		Local Master	“
		District Crown Attorney	A. G. Browning
		Clerk of the Peace	“
		Local Registrar	Thos. J. Bourke
		District Court Clerk	“
		Surrogate Registrar	“
Norfolk	Simcoe.	Sheriff	Joseph Jackson
		Surrogate Judge	Judge Robb
		Local Master	“
		Crown Attorney	J. H. Ansley
		Clerk of the Peace	“
		Local Registrar	C. C. Rapelje
		County Court Clerk	“
		Surrogate Registrar	“

for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
....	....	483 20	1,129 96	58 15
4,041 40	2,689 15	500 00	....	462 80
....	....	....	....	1,064 35
....	....	....	....	2,130 70
2,158 05	1,308 02	*2,204 65	....	236 92
36 25	36 25	....	....	36 25
56 00	56 00	....	....	56 00
1,744 88	1,324 73	†873 40	....	....
....	....	693 51	....	43 00
816 53	797 78	600 00	....	48 60
....	....	....	....	66 18
....	....	....	....	101 75
1,613 56	407 36	*2,411 41	....	....
36 25	36 25	....	....	36 25
4 70	4 70	....	....	4 70
839 02	771 87	†562 55	....	....
....	....	276 47	....	....
958 05	898 03	150 00	....	36 20
....	....	450 00	....	233 45
....	....	....	....	88 40
1,588 83	1,256 20	849 03	574 79	214 42
299 25	299 25	....	....	299 25
32 98	32 83	....	....	33 68
1,375 49	1,341 70	312 20	196 10	5 00
....	....	160 20	684 44	25 95
2,087 62	1,983 46	675 00	....	221 70
....	....	....	....	396 50
....	....	....	....	757 05

* Of this $500 is salary. † Including $250 salary.

APPENDIX G.—Showing total and net receipts of officers

County or district.	County town.	Office.	Officer.
Northumberland and Durham.	Cobourg	Sheriff	I. O. Proctor
		Surrogate Judge	Judge Benson
		Local Master	J. H. Dumble
		Crown Attorney	J. W. Kerr
		Clerk of the Peace	“
		Local Registrar	John Fisher
		County Court Clerk	“
		Surrogate Registrar	“
Ontario	Whitby	Sheriff	J. F. Paxton
		Surrogate Judge	Judge Dartnell
		Local Master	“
		Crown Attorney	J. E. Farewell, Q.C
		Clerk of the Peace	“
		Local Registrar	L. T. Barclay
		County Court Clerk	“
		Surrogate Registrar	“
Oxford	Woodstock	Sheriff	James Brady
		Surrogate Judge	Judge Finkle
		Local Master and Deputy Registrar	W. T. McMullen
		Crown Attorney	F. R. Ball, Q.C
		Clerk of the Peace	“
		Deputy Clerk of Crown	James Canfield
		County Court Clerk	“
		Surrogate Registrar	“
Parry Sound	Parry Sound	Sheriff	Samuel Armstrong
		Surrogate Judge	Judge Mahaffy
		Local Master	“

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* This includes

for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
3,918 12	1,947 84	958 72	808 00	1,842 55
....	commuted at	840 00	....	....
134 30	129 30	....	....	134 30
2,443 55	2,026 60	1,272 53	76 00	5 60
....	....	333 60	708 58	4 15
2,872 72	2,215 09	750 00	....	238 95
....	....	....	....	725 41
....	....	....	....	1,237 02
1,814 84	1,354 68	739 83	591 30	522 67
606 50	606 50	....	....	606 50
281 30	281 30	....	....	281 30
1,714 04	1,307 57	388 30	....	110 10
....	....	225 30	1,039 30	33 85
2,223 40	1,858 56	675 00	....	44 20
....	....	....	....	495 60
....	....	....	....	1,008 60
2,826 19	1,559 93	1,429 35	450 80	910 57
734 25	734 25	....	....	734 25
1,406 68	1,302 68	....	....	1,406 68
1,929 66	1,904 51	696 40	....	....
....	....	88 45	682 71	....
3,039 00	2,534 70	450 00	....	514 00
....	....	....	....	693 80
....	....	....	....	1,589 35
2,311 39	1,189 57	*1,814 91	....	408 24
28 00	28 00	....	....	28 00
....	see Muskoka.	....	....	....

$500 salary.

APPENDIX G.—Showing total and net receipts of officers

County or district.	County town.	Office.	Officer.
Parry Sound.—*Con.*	Parry Sound	District Attorney.......... Clerk of the Peace	See under Muskoka....... .
		Local Registrar..............	E. Jordan ....
		District Court Clerk	" ....
		Surrogate Registrar...... ...	" ....
Peel.	Brampton	Sheriff	Robert Broddy ....
		Surrogate Judge	Judge McGibbon ....
		Local Master................	" ....
		Crown Attorney	W. H. McFadden. ... .
		Clerk of the Peace	" ....
		Local Registrar..............	J. A. Austin ....
		County Court Clerk..........	" ....
		Surrogate Registrar..........	" ....
Perth	Stratford.....	Sheriff	John Hossie.................
		Surrogate Judge	Judge Woods............ ...
		Local Master................	J. E. Harding, Q.C..........
		Crown Attorney	John Idington, Q.C..........
		Clerk of the Peace	" ....
		Local Registrar..............	Jas. Macfadden..............
		County Court Clerk..........	" ....
		Surrogate Registrar..........	" ....
Peterborough	Peterborough......	Sheriff	Jas. A. Hall ....
		Surrogate Judge	Judge Weller................
		Local Master................	" ....
		Crown Attorney	Robert E. Wood............
		Clerk of the Peace	" ....
		Local Registrar	John Moloney ....
		County Court Clerk....... ..	" ....
		Surrogate Registrar..........	" ....

for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From county.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
724 49	720 13	600 00		25 95
				21 30
				77 24
2,003 86	1,057 57	779 80	382 25	676 33
421 75	421 75			421 75
91 38	91 38			91 38
1,283 83	1,203 53	430 95		43 00
		215 05	747 65	31 18
1,791 92	1,634 19	600 00		86 20
				364 27
				732 38
2,009 41	977 22	875 30	409 41	917 38
775 00	775 00			775 00
832 26	832 26			832 26
1,268 95	1,000 41	492 80		5 00
		92 35	662 64	3 00
2,936 40	1,802 76	675 00		548 90
				480 65
				1,184 30
1,821 53	1,134 15	759 97	442 81	639 47
294 00	294 00			294 00
283 00	283 00			283 00
1,183 93	1,154 93	390 91	22 31	
		102 40	592·34	78 00
1,748 43	1,465 43	675 00		205 25
				392 35
				475 83

APPENDIX G.—showing total and net receipts of officers

County or district.	County town.	Office.	Officer.
Prescott and Russell.	L'Orignal	Sheriff	Albert Hagar ....
		Surrogate Judge.	Judge O'Brian. ....
		Local Master.........	" ....
		Crown Attorney.............	John Maxwell ....
		Clerk of the Peace	" ....
		Local Registrar	John Fraser . ...
		County Court Clerk..........	" ....
		Surrogate Registrar	" ....
Prince Edward	Picton	Sheriff	Jas. Gillespie................
		Surrogate Judge............	Judge Merrill ....
		Local Master................	C. H. Widdifield ....
		Crown Attorney.............	J. Roland Brown............
		Clerk of the Peace	" ....
		Local Registrar	W. H. R. Allison, Q.C ....
		County Court Clerk.	" ......
		Surrogate Registrar.	" ......
Rainy River	Rat Portage.......	Sheriff	W. H. Carpenter...........
		Surrogate Judge.............	Judge Fitzgerald ....
		Local Master................	" ....
		District Crown Attorney	H. Langford ....
		Clerk of the Peace...........	" ....
		Local Registrar	Frank J. Apjohn ....
		District Court Clerk.........	" ....
		Surrogate Registrar	" ....
Renfrew	Pembroke.........	Sheriff	Wm. Moffatt................
		Surrogate Judge........	Judge Deacon ....
		Local Master.....	" ....

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*This includes $500 salary paid by Government. †This includes $200 salary paid by Govern-

for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
2,177 80	1,344 73	*1,517 42	375 84	833 89
161 50	161 50	....	....	161 50
107 10	107 10	....	....	107 10
1,263 90	1,208 82	267 77	71 16	30 00
....	....	159 40	724 17	11 40
1,353 63	1,128 13	675 00	....	123 55
....	....	....	....	201 53
....	....	....	....	368 51
1,645 55	706 38	†1,053 57	468 15	324 80
180 75	180 75	....	....	180 75
84 93	84 93	....	....	84 93
763 10	721 62	129 30	....	10 00
....	....	90 15	530 39	29 05
1,481 28	1,434 53	600 00	....	57 39
....	....	....	....	473 62
....	....	....	....	350 27
2,592 08	1,600 39	‡1,767 36	....	318 28
34 00	34 00	....	....	34 00
See under Thunder Bay		....	....	....
549 70	541 70	§397 40	....	....
....	....	144 75	....	7 55
1,294 39	1,274 39	700 00	....	341 30
....	....	....	....	182 60
....	....	....	....	70 49
2,363 34	1,589 34	1,156 30	594 95	784 00
....	commuted	264 00	....	....
57 70	55 67	....	....	57 50

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ment. ‡This includes $1,000 salary paid by Government. § This includes $250 salary

Appendix G.—Showing total and net receipts of officers

County or district.	County town.	Office.	Officer.
Renfrew.—*Con*	Pembroke	Crown Attorney	J. A. Metcalfe
		Clerk of the Peace	“
		Local Registrar	Archibald Thomson
		County Court Clerk	“
		Surrogate Registrar	“
Simcoe	Barrie	Sheriff	Hon. Chas. Drury
		Surrogate Judge	Judge Ardagh
		Local Master	J. R. Cotter
		Deputy Registrar	“
		Crown Attorney	“
		Clerk of the Peace	“
		Deputy Clerk of Crown	J. McL. Stevenson
		County Court Clerk	“
		Surrogate Registrar	“
Stormont, Dundas and Glengarry	Cornwall	Sheriff	A. McNabb
		Surrogate Judge	Judge Pringle
		Local Master	“
		Crown Attorney	Jas. Dingwall
		Clerk of the Peace	“
		Local Registrar	John A. McDougald
		County Court Clerk	“
		Surrogate Registrar	Helen McDonald
Thunder Bay	Port Arthur	Sheriff	Alex. W. Thompson
		Surrogate Judge	Judge Fitzgerald
		Local Master	“
		District Crown Attorney	Thos. A. Gorham
		Clerk of the Peace	“

†Includes $250 salary. *This includes

for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
1,627 34	1,445 27	649 70	....	87 68
....	....	96 40	458 00	32 75
1,627 34	1,357 02	600 00	....	52 00
....	....	....	....	425 33
....	....	....	....	413 19
3,817 55	1,872 93	1,456 40	590 48	1,795 54
....	commuted	585 00	....	....
3,131 71	2,905 74	....	....	548 35
....	....	....	....	295 85
....	....	1,020 80	....	134 75
....	....	265 10	828 36	38 50
2,999 09	2,396 97	500 00	....	306 55
....	....	....	....	876 77
....	....	....	....	1,315 77
3,026 40	1,013 89	979 47	1,198 10	1,077 10
500 75	500 75	....	....	500 75
287 50	287 50	....	....	289 20
711 25	667 19	171 29	16 59	....
....	....	117 60	439 22	53 29
1,567 70	1,545 18	750 00	....	156 75
....	....	....	....	660 95
893 64	893 64	....	....	893 64
2,491 95	1,939 69	*2,022 23	....	517 77
48 00	48 00	....	....	48 00
9 00	9 00	....	....	9 00
707 31	598 06	†469 30	....	....
....	....	238 01	....	....

$1,000 salary paid by Government.

APPENDIX G.—Showing total and net receipts of officers

County or district.	County town.	Office.	Officer.
Thunder Bay.—*Con.*	Port Arthur	Local Registrar	James Meek
		District Court Clerk	"
		Surrogate Registrar	"
Victoria	Lindsay	Sheriff	John McLennan
		Surrogate Judge	Judge Dean
		Local Master	"
		Crown Attorney	A. P. Devlin
		Clerk of the Peace	"
		Local Registrar	Wm. Grace
		County Court Clerk	"
		Surrogate Registrar	"
Waterloo	Berlin	Sheriff	Moses Springer
		Surrogate Judge	Judge Chisholm
		Local Master	J. J. A. Weir
		Crown Attorney	W. H. Bowlby, Q.C.
		Clerk of the Peace	"
		Local Registrar	John McDougall
		County Court Clerk	"
		Surrogate Registrar	A. J. Peterson
Welland	Welland	Sheriff	James Smith
		Surrogate Judge	Judge Fitzgerald
		Local Master	"
		Crown Attorney	T. D. Cowper
		Clerk of the Peace	"
		Local Registrar	Isaac P. Wilson
		County Court Clerk	"
		Surrogate Registrar	"

* This includes $100 salary

for 1897, and sources from which derived, etc.—*Continued.*

Total receipts.	Net receipts.	From Government.	From County.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
1,187 02	1,152 27	600 00	....	180 25
....	....	....	....	280 20
....	....	....	....	108 95
2,196 61	1,699 31	842 20	721 90	622 16
....	commuted	500 00	....	....
....	commuted	900 00	....	....
1,127 21	1,127 21	445 60	....	10 00
....	....	115 25	589 66	....
1,540 53	1,475 53	675 00	....	88 00
....	....	....	....	319 90
....	....	....	....	441 67
2,235 91	1,446 92	*1,110 72	441 76	683 43
914 25	914 25	....	....	914 25
42 00	41 70	....	....	42 00
1,749 90	1,325 10	504 10	4 20	....
....	....	170 30	1,000 00	10 20
1,744 02	1,414 02	1,075 00	....	254 05
....	....	....	....	414 97
1,074 39	674 39	....	....	1,074 39
2,071 00	1,505 75	815 70	644 84	561 21
415 00	415 00	....	....	415 00
96 86	96 86	....	....	96 86
2,256 02	1,631 54	538 60	....	1 40
....	....	129 00	1,270 69	....
1,940 90	1,607 91	600 00	....	160 50
....	....	....	....	323 90
....	....	....	....	872 20

paid by Government.

APPENDIX G.—Showing total and net receipts of officers

County or district.	County town.	Office.	Officer.
Wellington	Guelph	Sheriff	Robt. McKim
		Surrogate Judge	Judge Chadwick
		Crown Attorney	H. W. Peterson
		Clerk of the Peace	“
		Local Master	A. M. McKinnon
		Local Registrar	“
		County Court Clerk	Wm. Carroll
		Surrogate Registrar	Alex. Mackenzie
Wentworth	Hamilton	Sheriff	John H. Murton
		Surrogate Judge	Judge Snider
		Local Master and Deputy Registrar	J. E. O'Reilly
		Crown Attorney	John Crerar, Q.C.
		Clerk of the Peace	“
		Deputy Clerk of Crown	S. H. Ghent
		County Court Clerk	“
		Surrogate Registrar	“
York	Toronto	Sheriff	J. H. Widdifield
		Surrogate Court	Judge Macdougall
		“	Judge Morgan
		“	Judge Morson
		Crown Attorney	H. H. Dewart
		Clerk of the Peace	T. H. Bull
		Surrogate Registrar	Joseph Tait
		County Court Clerk	Hon. A. M. Ross
Toronto City	Toronto	Sheriff	Fred. W. Mowat
		Crown Attorney	J. W. Curry

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† Of this $559.87 was payable by

for 1897, and sources from which derived, etc.—*Concluded.*

Total receipts.	Net receipts.	From Government.	From county.	From general public.
$ c.	$ c.	$ c.	$ c.	$ c.
2,581 56	872 16	1,191 05	575 75	795 62
888 00	888 00	....	....	888 00
2,844 60	2,061 74	903 83	....	46 60
....	....	303 60	1,700 00	66 00
2,153 20	1,944 75	....	....	1,337 01
....	....	750 00	....	140 24
556 80	552 80	....	....	556 80
1,494 34	1,320 34	....	....	1,494 34
3,527 78	1,748 90	1,758 20	461 17	1,363 59
1,000 00	1,000 00	....	....	1,000 00
....	commuted at	3,500 00	....	....
2,284 60	1,984 60	1,453 60	....	....
....	....	161 45	669 55	....
4,101 93	2,893 58	500 00	....	518 37
....	....	....	....	1,322 43
....	....	....	....	1,746 59
5,899 55	2,992 74	4,092 65	756 13	1,130 56
2,975 75	2,975 75	....	....	2,975 75
....	....	666 00	....	....
....	....	666 00	....	....
2,555 68	1,758 18	2,396 70	122 00	36 98
2,458 28	1,658 28	1,023 15	2,153 27	114 25
4,508 97	2,769 41	....	....	4,508 97
4,702 45	2,754 55	....	....	4,702 45
8,516 06	3,427 52	3,409 32	†888 87	4,811 12
3,339 00	2,849 80	3,374 00	....	....

County and $329.00 by City.

143

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